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The IRON AGE

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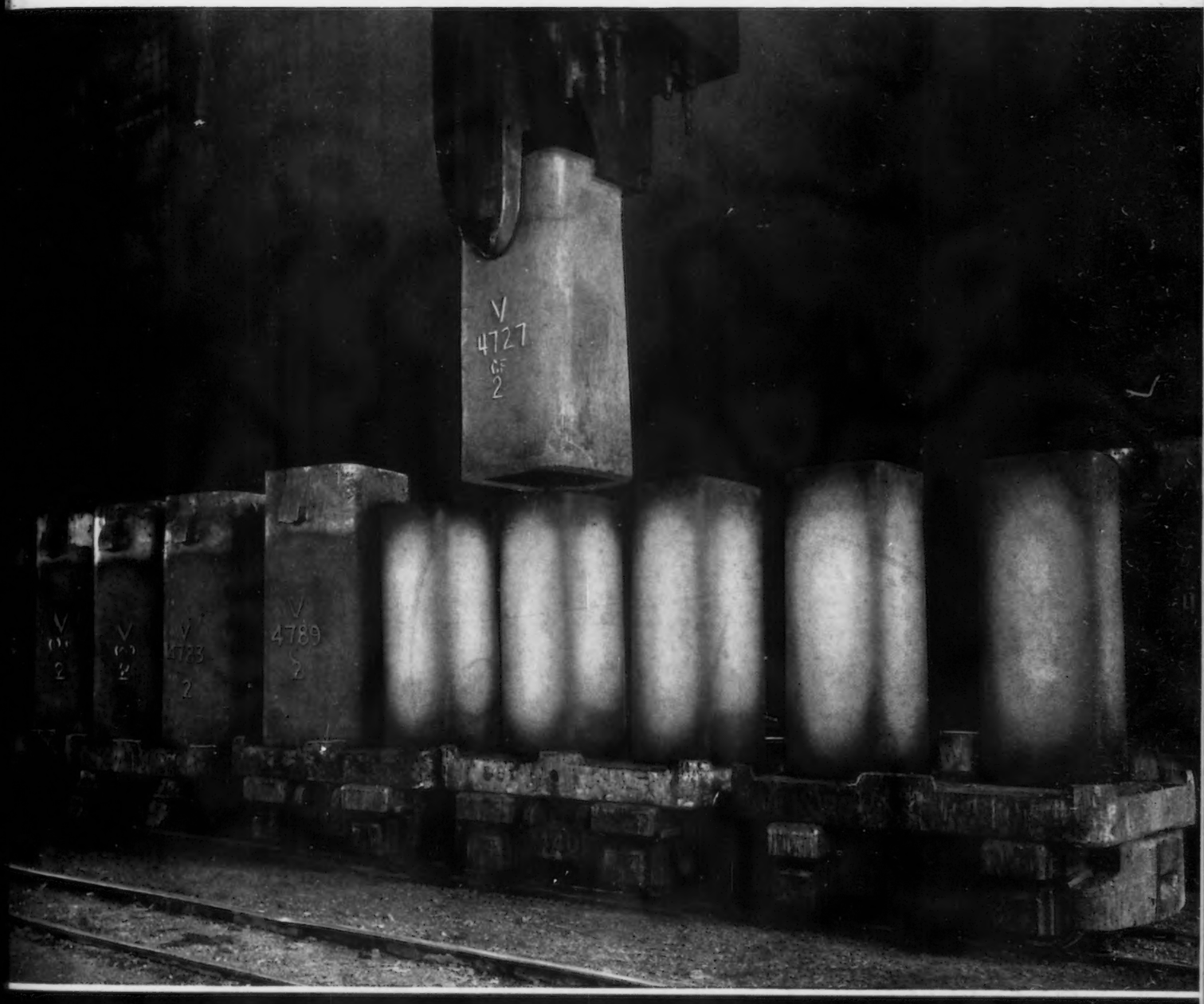

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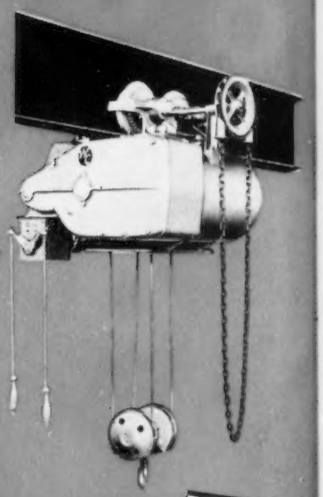

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Member, Audit Bureau of Circulations
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Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50; Foreign, $12.00 a year. Single copy, 25 cents.
Cable Address, "Ironage, N. Y."

Owned and Published by
CHILTON COMPANY
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Publication Office	Editorial and Executive Offices
Chestnut and 56th Sts. Philadelphia, Pa. U.S.A.	100 East 42nd St., New York, N. Y. U.S.A.

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The Iron Age

OCT. 3, 1940

ESTABLISHED 1855

"The People's Choice"

THE election coming next month will be the most fateful one since Lincoln was chosen to save his country. It differs even from that one because this time we are not choosing a President so much as we are deciding upon what Mr. Willkie terms "a way of life."

The intelligent voter will or should lay aside the preference for personalities or parties which too often tend to becloud great issues. He should ask himself "to what future way of life will Mr. Roosevelt or Mr. Willkie direct us?" And having answered that he should then inquire "which of these ways of life are best for my country, myself and my children?"

One may ask, at this point, whether there is a sufficiently clear divergence between the ways of life that the candidates stand for to enable one to make an intelligent choice? I think there is, if you will take the trouble to look for it. For laying aside those matters, such as armament for defense and maximum help to England short of war, on which there is little difference between the two, the way of life that Willkie seeks to have us follow and that upon which Mr. Roosevelt has placed our feet are widely divergent.

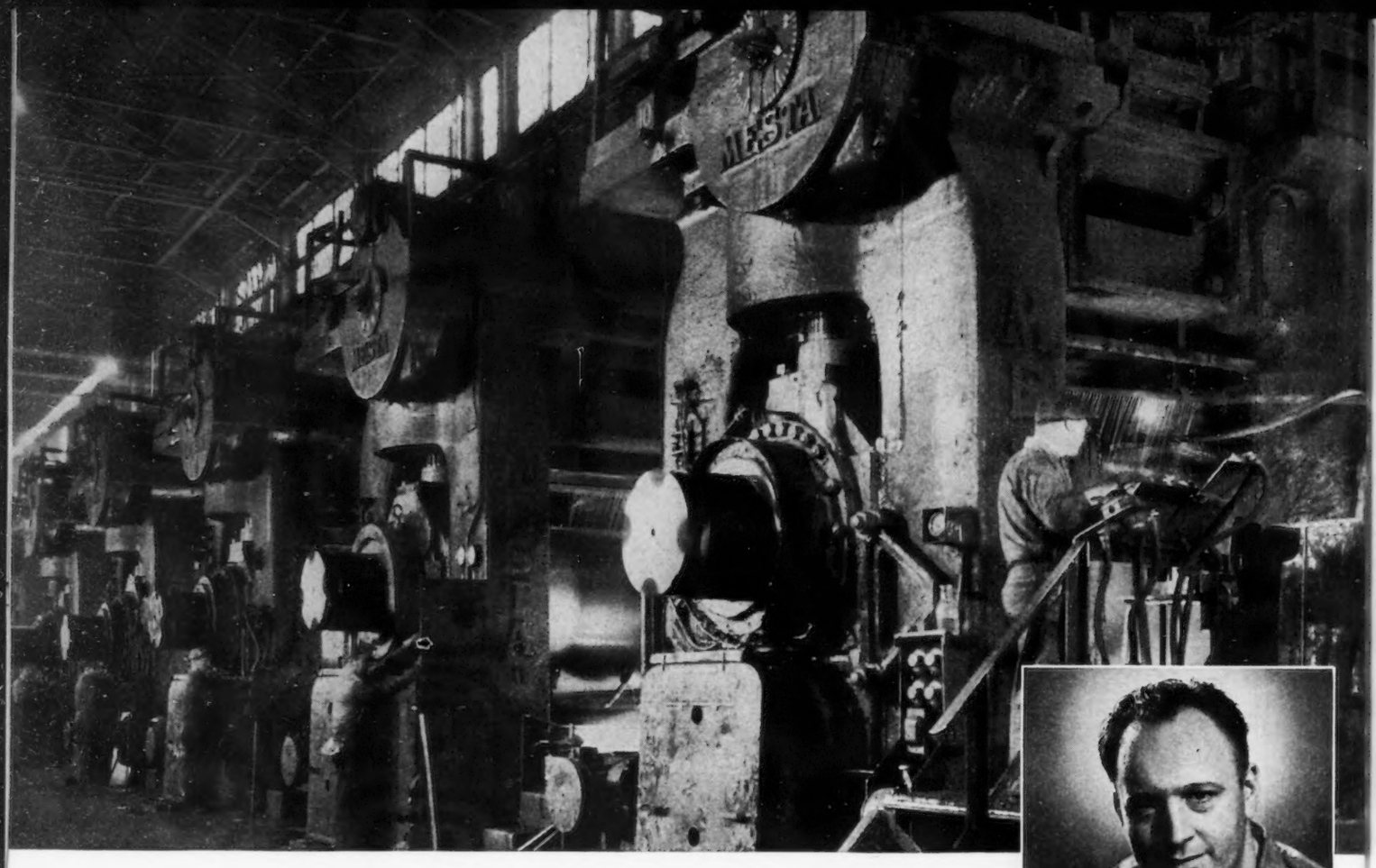
The choice of Roosevelt means continued and increasing debt as the American way of life. It means approaching the "rocks of loose fiscal policy on which so often liberal governments have been wrecked," of which Mr. Roosevelt warned us in 1932 when our national debt was only $22 billions. It means following the road to inflation that ruined Germany in 1923, the avenue of unchecked extravagance down which Blum led unfortunate France to defeat and servitude.

The path of debt is inherently Roosevelt's path. Debt for other people. His footprints have traced this path through life, through his private business ventures and his public offices. In his capacities as Governor of New York and as President of the United States, he has achieved the distinction of being the greatest debt builder of all time.

After more than 11 years of practice as a deficit creator and a debt builder, it is not possible for Mr. Roosevelt, at his age and with this background, to reverse his course. A choice of his way of life on November 4 means continuing us down the one way road of deficit that leads to disaster.

Can Wendell Willkie show us the way back? It will be a Herculean task. But Willkie is young and strong and his entire way of life has been to handle debt as a manageable tool and not let it become an unmanageable monster.

At least Wendell Willkie will make every intelligent effort to restore fiscal sanity and soundness to the administration of America's affairs. Tough as it may be, he will make a start at getting us out of the hole, while Mr. Roosevelt will surely get us further and further into it!



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Corrosion Cracking

—A correlated abstract on the nature and results of corrosion cracking and related phenomena. Also, data on residual stresses developed by different working processes, and various types of stress relief

By G. SACHS

Case School of Applied Science, Cleveland

METALS and alloys often develop cracks and checks in service without any apparent reason. One frequent source of such failures is the presence of residual or internal stresses that have been retained from the shaping. The term "residual stresses" is hereby generally confined to such *macroscopic* stresses which can be ascertained by mechanical methods (machining), while the *microscopic* stresses between and within the crystals can be observed only by means of X-rays. These microscopic stresses have a different effect from the residual stresses and are the source of the elastic imperfections.

There are fundamentally two types of residual stresses, the strain hardening and the cooling stresses. Residual stresses may originate directly from a non-uniform cold working process. The distribution and magnitude of these strain-hardening stresses can be calculated in a satisfactory although approximate manner for such simple cases as bending and torsion[1], expanding of tubes[2] and rotation of disks.[3]

The residual stresses can be determined from the generalization that they represent the difference between the acting stresses during the deformation under load and the stresses of an elastic condition corresponding to the same load, no external forces and moments being retained. This principle is illustrated for bending[4] in Fig. 1, and for the expanding of a tube in Fig. 2. However, most manufacturing processes are very complicated and their stress-strain relations are not sufficiently known to permit calculation of the resulting residual stresses. A specific process, such as wire drawing, may be more or less uniform and very large or very small residual stresses may originate, depending upon the shape of the tools and other features of the working process (Fig. 3).

A large variety of residual stresses are derived indirectly from deformations accompanying processes characterized by a non-uniform cooling. All of these stresses result from a non-homogeneous thermal contraction or a volume change during a phase transformation, within the temperature range of cold work. As long as the temperature of some parts of the metal remains within the range of hot deformation only very small stresses are retained, as the hotter sections are able to yield and thus to relieve the stresses.

Internal stresses are also present in any bimetal composed of two metals with different coefficients of thermal expansions, and in any multiple-piece tool or structure formed by shrinking a heated tubular part on a core or by pressing an insert into an undersized hole.

Residual stresses may have a beneficial as well as a deleterious effect. The following advantages of different types of residual stresses have been commercially utilized:

(1) Stresses produced by plastic expansion are used to increase the strength of guns and pressure vessels (Fig. 2). This process is called autofrettage. The strength of rotating

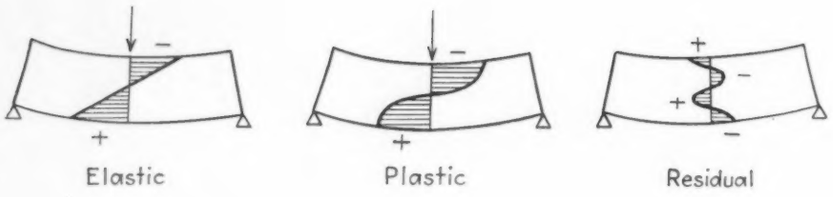

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FIG. 1 — Diagrammatic representation of the development and distribution of residual stresses in bending.

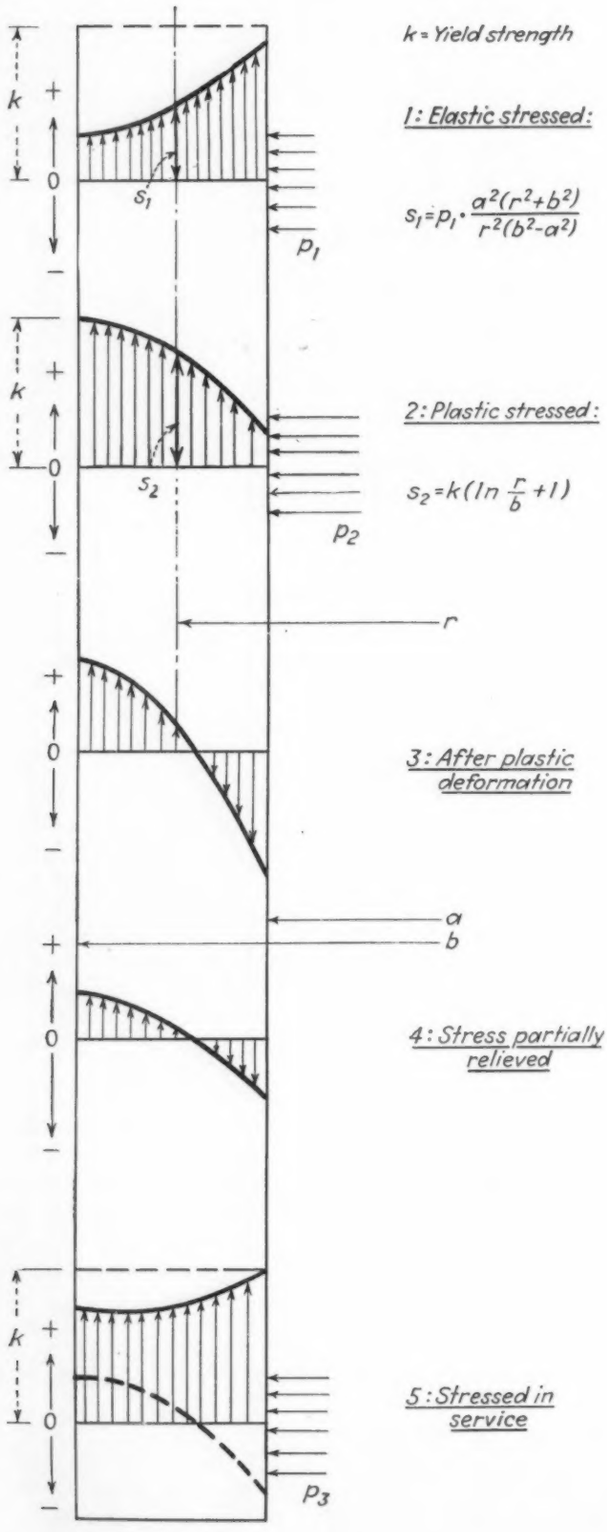

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FIG. 2 — Diagrammatic representation of the development of residual stresses and service stresses in the autofrettage of a gun barrel.

wheels can also be enhanced by a previous overloading.

(2) Stresses derived from shrinking are also used to increase the mechanical properties of guns.

(3) Stresses created by shrinking or inserting are used to improve the service life of extrusion cylinders,[5] forging and drawing dies.[6]

(4) Stresses formed by quenching increase the fatigue strength.[7]

(5) Stresses derived from local deformations, particularly surface rolling, reduce to a considerable extent the injurious effects on the fatigue strength of notches, corrosion and chafing.[7a]

In all of these applications internal compression stresses are produced in those portions of the surface where high tension stresses are formed by the service strain. The former stresses decrease the magnitude of the applied stress in the case of a static loading; and in fatigue the stress cycle is displaced toward compression.[8]

The principal detrimental effects that may accompany residual stresses are:

(1) Warping during machining, which depends upon the magnitude of the stresses, their distribution, and the quantity and location of the removed metal. Warping may be negligible if the high stresses are symmetrically distributed and the machining operation correspondingly conforms.

(2) Season cracking, fire cracking and cracking during the soldering and brazing of cold worked steels and copper alloys.

(3) Materials quenched for the purpose of hardening, such as steels and the duralumin type alloys, often crack after quenching.

(4) Castings and ingots may crack on cooling, storing or reheating.

(5) The residual stresses in fusion welded structures are generally considered to be deleterious. (This has not been proved as yet.)

(6) Certain alloys, subjected to mild corrosion, crack when sufficiently high stresses are present.

(7) Steel boilers subjected to corrosion crack around riveted or otherwise deformed sections.

Corrosion Cracking

The different types of cracking have been traced in every case to the presence of high tensile stresses at the point of failure. Some of the cracking phenomena are derived from stresses that are created by external forces.

The most familiar result of residual stresses is the season cracking or cor-

rosion cracking of drawn rods, tubes and hollowware in service.[9] Deep drawn articles may form a few or a large number of longitudinal and circumferential cracks (Fig. 4), rods and tubing may split parallel or transverse to the length or sometimes in spirals. The fractures give the appearance of brittleness and microscopic investigation reveals, in most cases, the intercrystalline nature of the failure (Fig. 5). However, in the α-β brasses with a heterogeneous structure, the cracks pass through the β crystal grains.[10] Also magnesium alloys usually and stainless steels (18-8) occasionally crack through the grains.

The alloys which are the most susceptible to corrosion cracking are the low copper brasses. The presence of residual tensile stresses above approximately 12,000 lb. per sq. in. is sufficient to cause season cracking in tubes of Muntz metal, containing 60 per cent copper, which is the most sensitive composition.[11] Corrosion cracking in sunk high brass tubing with 70 per cent copper[11a] occurs when stresses above 15,000 lb. per sq. in. are present (Fig. 6). However, soft tempers (⅛ to ¼ hard) do not crack with residual stresses as high as 20,000 lb. per sq. in. The higher the stresses, the greater is the cracking tendency. Season cracking is attributed to the corrosive attack of the ammonia content of the atmosphere[12] on strained metal, while another corrosive agent is soapy water.[13] The susceptibility of copper-zinc alloys increases with an increasing zinc content[13a]; alloys with 85 to 90 per cent copper are immune and with 80 per cent copper fairly free from cracking (Fig. 7). Coarse grained brasses are more liable to fail than fine-grained.[14] The presence of β crystals in brasses with 60 to 63 per cent copper reduces the danger of cracking.[15] The influences of the surface finish and of protective coatings are not yet clear; and acid remaining under a chromium plate might be a source of some failures.

Special brasses which contain other elements, such as iron, tin, manganese, silicon, aluminum, cadmium and also lead, behave similarly to the straight zinc brass.[16] Contradictory results of these metals have also been reported.

Solutions of mercury salts are generally used to test the tendency of brass to corrosion crack.[17] A solution containing 1 per cent mercurous nitrate and 1 per cent nitric acid is recommended after degreasing and pickling with a 40 per cent nitric acid to clean the surface. This test (mer-

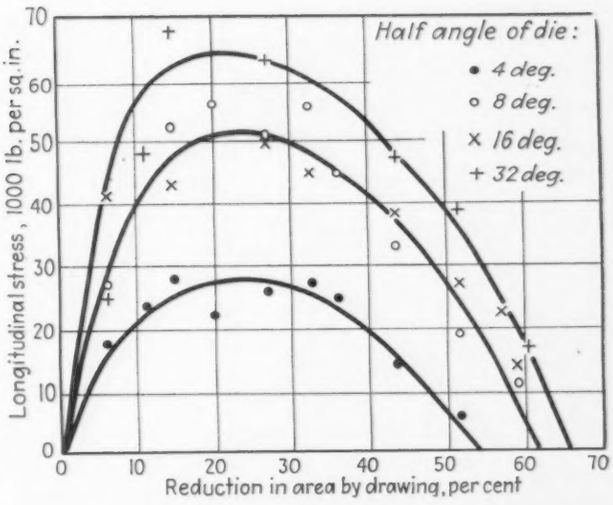

FIG. 3 — Residual stress in high brass (63 Cu, 37 Zn) wires, drawn different reductions in a single draw with cemented carbide dies of various angles.

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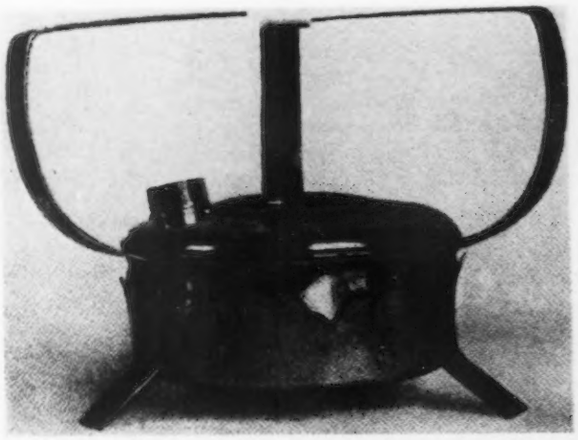

FIG. 4 — Brass lamp that developed season cracking during service and then was subjected to a mercurous nitrate test.

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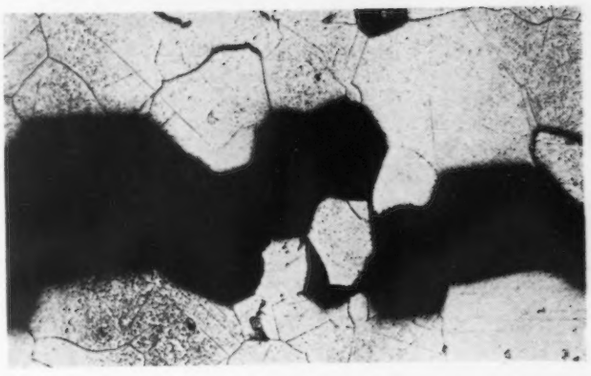

FIG. 5 — Intercrystalline stress corrosion crack in an austenitic stainless steel (21 Cr, 11 Ni) that was subjected to a horseshoe test. At 100 diameters. (Hoyt and Scheil).

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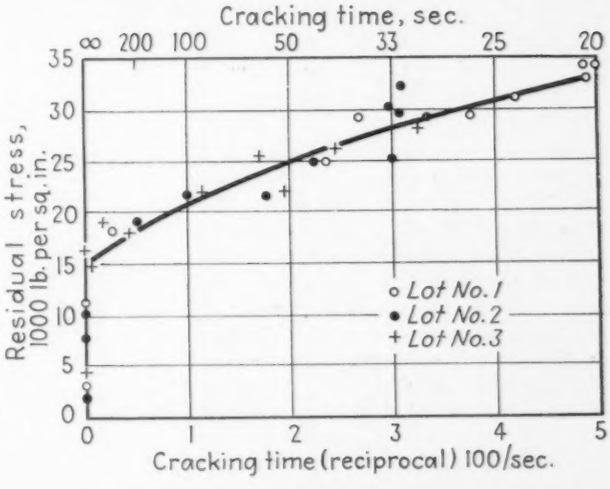


FIG. 6—The effect of the magnitude of residual stress in hard drawn high brass (70 Cu, 30 Zn) tubing, subjected to stress relief anneals at various temperatures, on the cracking time in the mercury test. Tubes sunk from ¾ in. O.D. by 1/32 in. wall thickness to ½ in. O.D.

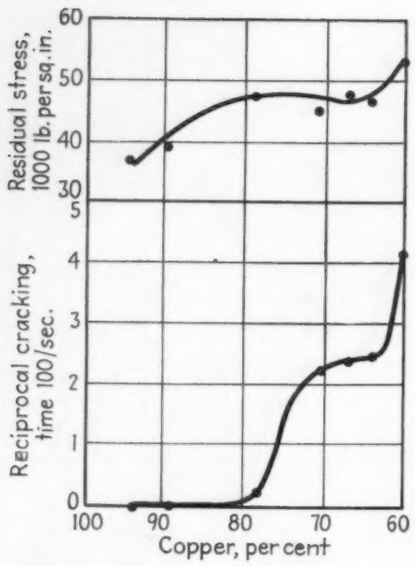


FIG. 7—Effect of copper content on residual stress and cracking time in mercury test of brass tubes, sunk from 1 in. O.D. by 0.060 in. wall thickness to 0.813 in. O.D. (Crampton).

cury test) causes a somewhat different type of chemical attack than is encountered in service, as metallic mercury is liberated at the brass surface. The results of this method are therefore somewhat doubtful, although it is the best test available. Deforming the test piece is a satisfactory method for detecting small cracks.[18]

At the present time, the season or corrosion cracking of brass does not present a serious problem to the producer. Stress relief and other manufacturing methods such as the proper combination of drawing and annealing have been developed which can supply brass products free from susceptibility to season cracking.

Other copper alloys such as tin-bronze, aluminum-bronze,[19] silicon-bronze,[20] arsenic-copper,[21] have a comparatively small tendency for season cracking.

Cracks in cold drawn free-machining steel rods[22] and in nickel steel[23] have been occasionally reported. The checking of boiler plates,[24] called caustic embrittlement, around rivets is attributed to the combined action of residual stresses created by the riveting and alkali solutions concentrated from the boiler water. Acids can also accelerate cracking of mild steels containing residual stresses.[25] Cracking of gunshells in the vicinity of the rotating band can be caused by the chemical attack of the explosive mixture or by the tinning.[26] Steel castings have been also found to crack during pickling.[27]

The other group of metals with a decided tendency for corrosion cracking are the austenitic stainless steels, particularly 18-8 steel. Deep drawn cups have to be fully annealed immediately after fabrication to prevent the development of cracks.[28] Cups with a flange are less liable to crack than straight cylindrical articles, etc. Intercrystalline failures resulting from both corrosion and stress have been observed[29] in chemical equipment made from insufficiently stabilized stainless steel (Fig. 5). A suitable test for such metal is to bend specimens into the form of a horseshoe, fasten them elastically in this position, and subject the assembly to a boiling solution of 10 per cent H_2SO_4 and 10 per cent $CuSO_4$ (Fig. 8). The metal specimens crack if susceptible to corrosion cracking. In addition to this phenomenon, intercrystalline and also transcrystalline failures have been encountered in tubes made of stainless steel[30] not susceptible to the normal intergranular corrosion, and this occurrence is more prevalent in metal that has not been stabilized. A mixture of ethyl chloride and water is especially effective in producing these stress-corrosion failures.

Binary aluminum alloys containing more than 12 per cent zinc and certain high strength complex zinc-bearing aluminum alloys such as the continental alloys Scleron, Constructual, etc., have such a pronounced tendency to crack under normal atmospheric conditions[31] that their application has been seriously retarded. Aluminum-magnesium alloys (Fig. 9) containing precipitate (more than 6 per cent magnesium) are also susceptible to stress corrosion in salt water and other highly corrosive environments.[32] The stress corrosion of the aluminum-magnesium alloys is accelerated by cold work which in turn increases the rate of precipitation. The more precipitate is present the faster occurs corrosion cracking. However, wrought aluminum alloys which have such a tendency to stress crack are not commercially employed in this country and failures of the character illustrated in Fig. 9 have not been encountered in commercial use of aluminum alloys.

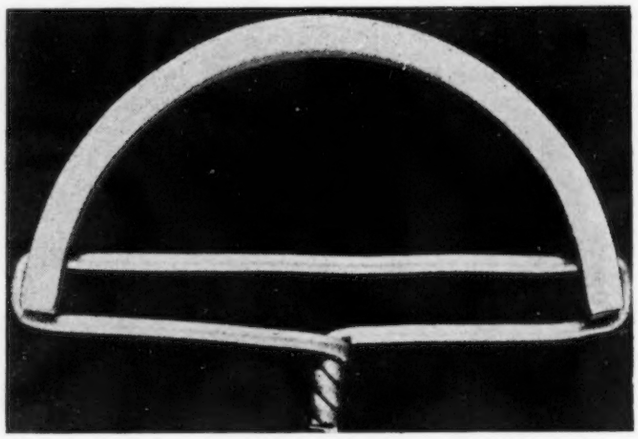
Stress cracking has been occasionally observed in wrought and cast magnesium alloys, if not adequately protected. Gold alloys containing copper and especially zinc are also liable to crack in service.[33]

The corrosion cracking of any metal is caused by the combined action of tensile stresses and corrosion. The tensile stresses may be of the residual or the enforced type, as previously discussed. The corrosion medium that is effective in corrosion cracking frequently attacks the metal only superficially if stresses are absent. However, this corrosion is an integral component of the corrosion cracking; and no stress corrosion takes place in vacuum[33a] or if the metal is electrolytically protected from corroding.[33b].

Closely allied to corrosion cracking is the cracking of metals and alloys that are simultaneously subjected to tensile stresses and the attack of molten metal. Such failures have been mainly observed in steel products, such as railroad axles and turbine blades, and particularly during the bending or setting of hot soldered and brazed parts.[34] Steel is attacked in this manner by copper and copper alloys above 1800 deg. F. (1000 deg. C.). Brasses are susceptible to the same type of stress cracking[35] when liquid solders are present. Tin causes cracking at 500 deg. F. (260 deg. C.) if tensile stresses in the brass exceed 30,000 lb. per sq. in., and lead at 660 deg. F. (350 deg. C.) if stresses of

o o o

FIG. 8 — Horseshoe sample used for testing the stress corrosion cracking of stainless steels. At 2 diameters. (Hoyt and Scheil.)



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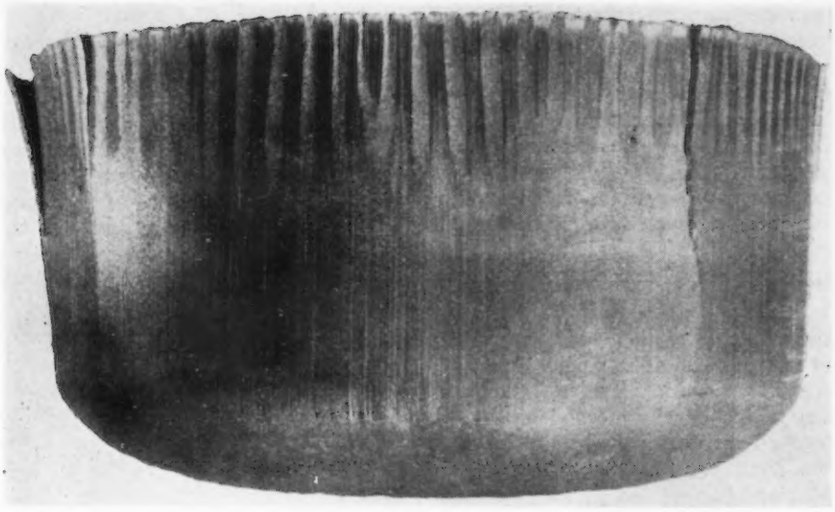


FIG. 9—Corrosion cracking of a cup drawn from aluminum-magnesium alloy (10 Mg) sheet. (Dix.)

more than 15,000 lb. per sq. in. are present.

A third type of cracking is observed during rapid heating (such as may occur during annealing or machining) of some alloys containing residual stresses. The cold worked nickel-silvers are particularly susceptible to this fire cracking.[36] Very pure and fine-grained alloys are less liable to crack than those of lower purity and coarse-grained. A stress relief anneal at 525 deg. to 575 deg. F. (250 deg. to 300 deg. C.) eliminates the possibility of fire cracking. The tendency of brass with 65 per cent copper to crack on sudden heating is sharply increased[37] by a lead addition (0.3 to 1.3 per cent) and also to a slight degree by a high iron content (0.09 to 0.15 per cent). Fire cracking has been also observed in bronzes increasing with their tin content,[38] and in white gold alloys containing nickel and especially zinc.[39]

However, fire cracking is not necessarily related to the presence of residual stresses. The thermal stresses originating from differences in temperature (at various locations), that are only present during the period of heating also frequently result in cracks. This is fundamentally the same or rather inverse phenomenon as the development of quenching cracks.

Stresses Developed by Working

The distribution and magnitude of residual stresses developed in a commercial working process depends upon the nature of this process and the specific manufacturing conditions. It has been also mentioned already that the danger of cracking is determined by the magnitude of tensile stresses that are present at the surface of the metal.

Hot deformation at sufficiently high temperatures and followed by slow cooling, does not create any appreciable residual stresses.[40] However, the commercial non-uniform and fast cooling may result in high residual stresses of the cooling type and cooling cracks in such products as shapes, boiler plates and forged shafts.

Cold work develops residual stresses only if the flow of metal is non-uniform. Thus, no residual stresses are retained after a uniform stretching by tension.[41]

Residual stresses in rolled sheet are small[42] and not commercially significant. The same is true for rolled rods.[43] Usually, low compression stresses are present in the surface layers and correspondingly tension stresses in the interior.

On the contrary, in a drawn rod or wire[44] residual tensile stresses occur in the exterior layers and compression stresses in the core, both in the longitudinal and in the circumferential direction (Fig. 10a). However, very

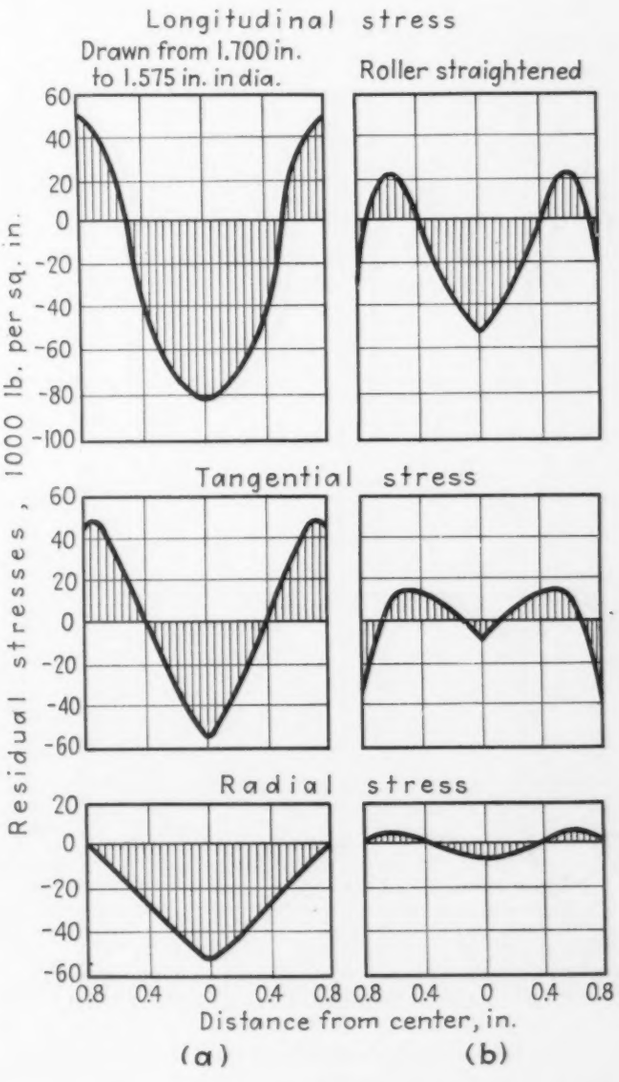


FIG. 10—Residual stresses in drawn Bessemer steel rods before (a) and after (b) straightening.

small reductions may form compression stresses on the surface.[45] The magnitude of the residual stresses depends upon the drawing conditions.[46] The larger the die angle, the higher the stresses; and for a specific die the stresses are at a maximum at medium reductions (Fig. 3).

In drawn tubing, the magnitude of the residual stresses is mainly determined by the distribution of the work on the reductions of the diameter and wall thickness respectively (Fig. 11). Sunk tubes possess very high residual tensile stresses in the surface layers.[47] However, the residual stresses are materially reduced, and there is little tendency to season crack when the decrease in the diameter is less than about 50 per cent of the reduction in area. Even with the very sensitive α-β brasses (Muntz metal), complete immunity from stress corrosion cracking is obtained when the residual stresses do not exceed 12,000 lb. per sq. in. Lower stresses are formed with an acute die than with a die with a large angle, and heavy reductions also create smaller residual stresses compared with medium reductions of about 20 to 30 per cent.[48]

While the corrosion cracking of deep-drawn or spun articles is a rather frequent occurrence, little systematic investigation has been done on this problem. The residual stresses in a drawn cup increase from the bottom to the edge.[49] Shells, ironed or drawn with a substantial wall reduction show considerably less tendency to crack than folded cups.[50]

The residual stresses in cartridge cases are reduced if dies that are tapered with an acute angle are used and a large reduction, rather than successive reductions in a stepped die, are performed.[51]

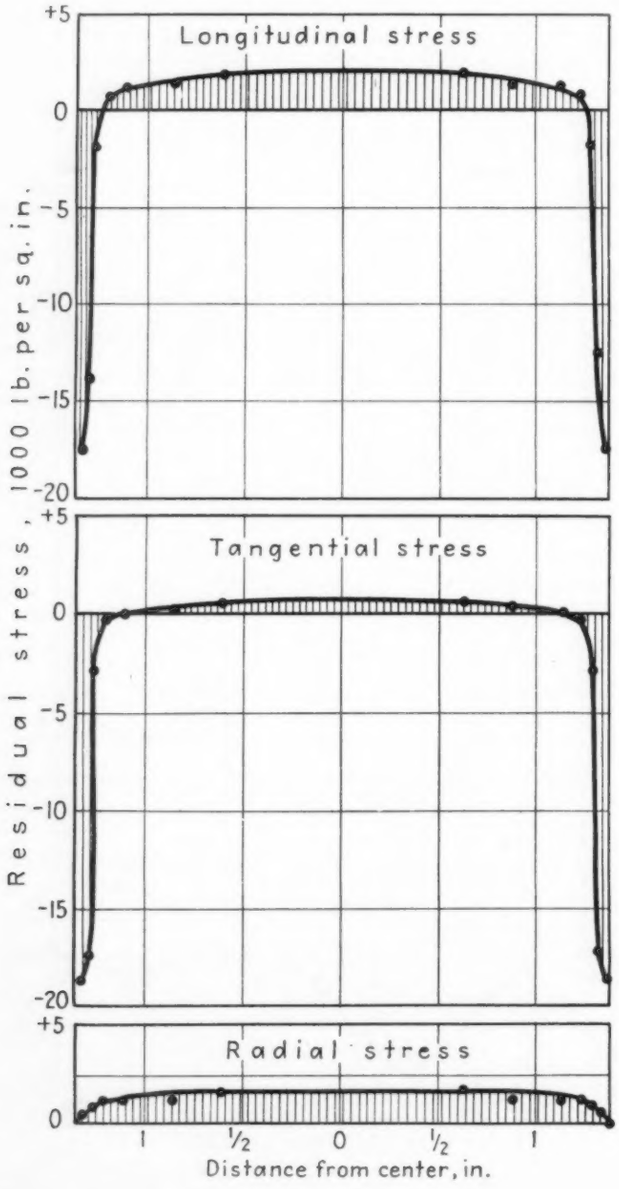
Straightening procedures both of the stretching and the roller straightening types change the magnitude and distribution of the residual stresses and reduce the tendency of corrosion cracking of rods, wire and tubing. Such processes are therefore used for stress relieving and will be discussed in the next section.

Surface treatments, such as the surface rolling[52] and shot-blasting which locally and progressively cold work the metal surface also create high residual stresses of the compression type in the surface layers (Fig. 12). These processes are utilized to a steadily increasing extent for improving the fatigue strength of steels and other metals in the presence of stress raisers.

Stress Relief

There are fundamentally two different methods of reducing or eliminating the detrimental effects of residual stresses, (1) a stress relief annealing treatment and (2) the application of special deformations.

Annealing at high temperatures which are above a certain limit, followed by slow cooling, can completely remove residual stresses of any type. This is illustrated in Fig. 13 for the strain hardening stresses in drawn (sunk) brass tubes[52a] and in Fig. 14 for the cooling stresses in normalized alloy steel tubes[52b]. This reheating limit probably is the same as the temperature range which separates the regions of cold and hot deformation, and also depends to the same degree



LEFT

FIG. 12—Residual stresses developed in a magnesium alloy propeller shaft by surface rolling.

BELOW

FIG. 11—Residual stress and cracking in the mercury test of high brass (66 Cu, 34 Zn) tubing, drawn different reductions in diameter and wall thickness. (Crampton.)

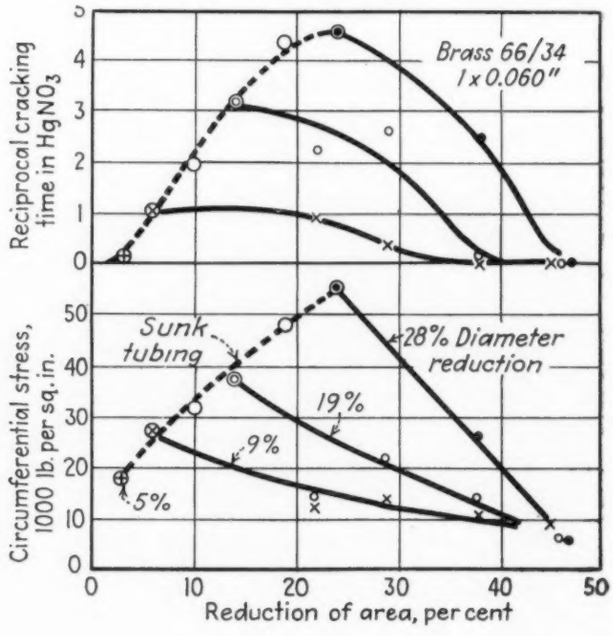
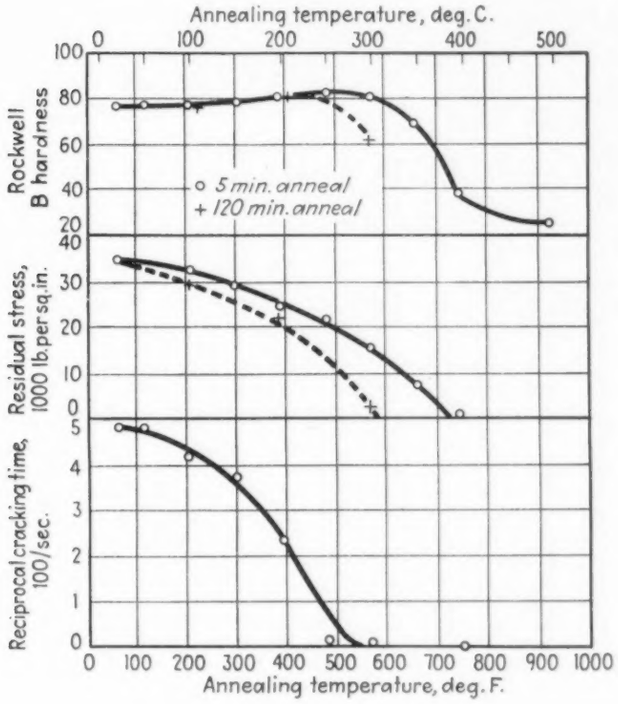


FIG. 13—Effects of stress relief annealing on hardness, residual stress and cracking in mercury test of sunk high brass (70 Cu, 30 Zn) tubing.


Annealing temperature, deg. C.
0 100 200 300 400 500
Rockwell B hardness
100 80 60 40 20
o 5 min. anneal
+ 120 min. anneal
Residual stress, 1000 lb. per sq. in.
40 30 20 10 0
Reciprocal cracking time, 100/sec.
5 4 3 2 1 0
0 100 200 300 400 500 600 700 800 900 1000
Annealing temperature, deg. F.

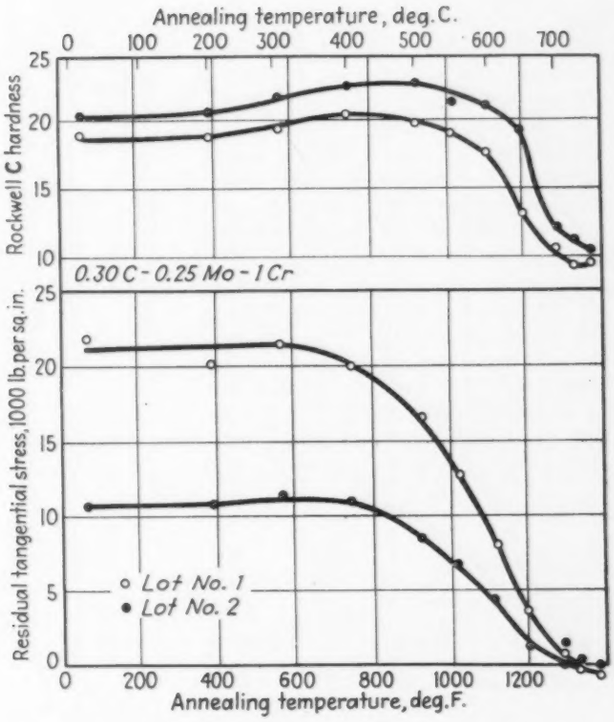

Annealing temperature, deg. C.
0 100 200 300 400 500 600 700
Rockwell C hardness
25 20 15 10
0.30 C - 0.25 Mo - 1 Cr
Residual tangential stress, 1000 lb. per sq. in.
25 20 15 10 5 0
o Lot No. 1
• Lot No. 2
0 200 400 600 800 1000 1200
Annealing temperature, deg. F.

FIG. 14—The effects of stress relief anneals on the magnitude of the residual stresses and the hardness of normalized low alloy steel tubing (0.30 C, 0.25 Mo, 1 Cr).

upon the time of heating (Fig. 13). Thus the following treatments are considered to be identical for complete stress relieval in 70-30 brass.[52]

390 deg. F. (200 deg. C.) for 96 hr.; 435 deg. F. (225 deg. C.) for 48 hr.; 480 deg. F. (250 deg. C.) for 5 hr.; 520 deg F. (275 deg. C.) for 1 hr.; 570 deg. F. (300 deg. C.) for 20 min.; 615 deg. F. (325 deg. C.) for 5 min.

An increase in temperature of 20 deg F. (10 deg. C.) corresponds approximately to doubling the time of annealing.

A stress relief often has to be performed in commercial practice in such a way that the properties of the material produced by strain-hardening, age-hardening, etc., are not substantially affected. The stresses in slightly or moderately strain-hardened metals can be materially decreased or even removed by annealing without affecting the hardness. However, the properties of hard tempers may be appreciably reduced by a stress relief anneal. This is probably explained by the relations illustrated in Fig. 15. The complete removal of stresses requires a definite annealing treatment which depends little on the hardness or the magnitude of the residual stresses. However, the hardness of a severely deformed metal is reduced by annealing at a lower temperature than is the hardness of a softer temper. The stress relieval of a 70-30 brass offers such a problem if the hardness exceeds 150 Brinell, and this also applies to a 63-37 brass with a hardness greater than 130 Brinell. In hard and spring tempers, therefore, often a compromise is necessary, such as the selection of a stress relief temperature low enough that the hardness is not seriously decreased and yet a certain fraction of the residual stresses is retained. Heat treated low and medium carbon steels can be completely stress relieved without substantially affecting the hardness.

The following stress relief treatments have been recommended for the different metals and alloys:

Cast iron:[53a] 900 deg. to 1100 deg. F. (475 deg. to 600 deg. C.) for ½ to 5 hr.

Carbon steel (cold worked and heat treated):[54] 925 deg. to 1200 deg. F. (500 deg. to 650 deg. C.) for 1 hr.

Carbon steel (welded):[55] 1200 deg. F. (650 deg. C.) for 1 hr.

Chromium-nickel steel:[56] 1100 deg. F. (600 deg. C.) for 1 hr.

Nickel, Monel metal and Inconel:[57] 750 deg. to 1200 deg. F. (400 deg. to 650 deg. C.) for ½ to 1 hr.

Brasses[58] 70-30: 525 deg. F. (275 deg. C.) for 1 hr.; 67-37: 575 deg. F. (300 deg. C.) for 1 hr.; 60-40: 350 deg. to 400 deg. F. (175 deg. to 200 deg. C.) for ½ hr.

Admiralty metal (70 Cu, 29 Zn, 1 Sn):[58] 575 deg. F. (300 deg. C.) for 1 hr.

Nickel silver:[59] 475 deg. F. (250 deg. C.) for 1 hr.

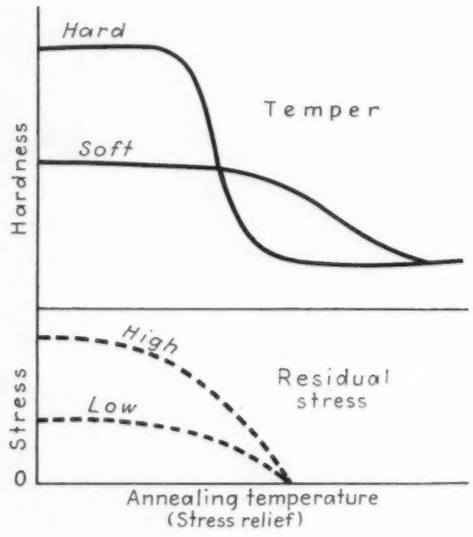
Gold alloys (8 karats, zinc containing):[60] 475 deg. to 575 deg. F. (250 deg. to 300 deg. C.) for ½ to 1 hr.

Magnesium alloys[61] (castings): 570 deg. F. (300 deg. C.) for 3 hr.

Stainless steel:[62] Cannot be stress relieved without affecting the corrosion resistance; the regular annealing at about 2000 deg. F. (1100 deg. C.), followed by quenching in cold water, changes, however, the residual stresses to the less harmful quenching type. However, stainless steels stabilized with columbium is not impaired by a low temperature heating and is now commercially stress relieved[62a] at temperatures between 1350 deg. and 1550 deg. F. (725 deg. and 850 deg. C.). Certain precipitation-hardened aluminum[63] alloys containing high stresses also cannot be stress relieved without reducing their mechanical properties. The only practice to obtain an essentially stress free product or one hav-

ing very low stresses is to quench in suitable agents, such as boiling water.

Stress relief treatments by means of plastic deformation are not generally applied to a degree sufficient to completely eliminate the residual stresses. A material reduction in the stresses is produced only by uniform strain such as tension or compression. Thus, the quenching stresses in a fractured piston rod were decreased to very low values by the hammering action of the broken parts, resulting in a compression of 0.8 per cent of the length of the rod. Stretching drawn brass rods (Fig. 16) containing high residual stresses by about 1 per cent, reduces the longitudinal



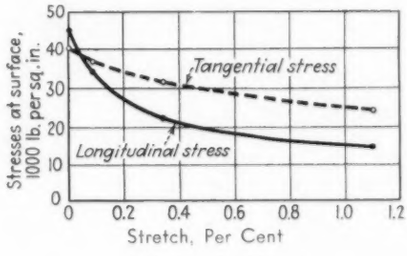
LEFT

FIG. 15—Diagrammatic representation of the effect of degree of cold working on the stress relief anneal.

° ° °

RIGHT

FIG. 16—Stress relief by stretching drawn brass rods.



stresses to about 30 per cent and the tangential stresses to about 65 per cent of their original values.[64] Other stress relief operations such as bending[65] create some complicated combinations of the original stresses and those derived from the bending process. However, bending stresses are effective particularly in decreasing the dangerous tensile stresses on the surface of materials or by converting them into less objectionable compression stresses. Roller straightening of the reeling type[66] produces high compression stresses at the surface; and when applied to a hard drawn rod will either materially reduce the high residual tensile stresses in the surface layers or transform them to compression stresses (Fig. 10b).

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Static Electricity on Belts

STATIC electricity in a powder plant can be a very troublesome hazard, so a well-known chemical company recently conducted tests with a General Electric electrostatic voltmeter to find out the extent of the static electricity generated on conveyor belts, motor drive belts, rubber tired trucks, and from actual walking on floors. In checking the V belt of a 25-hp. motor, the 20,000-volt static voltmeter went off scale—observation of the discharge spark indicated the presence of approximately 37,000 volts on the V belt. Another test indicated that 6000 volts were generated simply by walking across the carpet of an office.

These preliminary tests led to more extensive checks in all of the chemical company's plants. As a result, belt dressings were investigated to find one of a conducting nature that would permit a continuous discharge of accumulated static electricity. All trucks were equipped with grounding chains, various types of flooring were investigated, and many other changes were made to minimize the hazards of explosion from static electricity.

The G-E electrostatic voltmeter used in detecting the static is a 20,000-volt portable instrument designed for both a.c. and d.c. measurements of voltage on systems where one line is grounded. Operation is simply a matter of grounding the case, energizing the light source, and making the high-voltage connection.

◆ ◆ ◆ Adhesion of Nickel

THIS is the concluding section of a two-part article describing a series of tests to determine the efficiency of various etching methods in the preparation of various basis metals prior to nickel plating. Herein, attention is directed to an investigation of the Ollard test, and application of a modified Ollard test. This work is particularly timely in view of the many engineering and protective uses now being established for nickel deposits on ferrous alloys.

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INVESTIGATION of the Ollard test: In Ollard's work no definite dimensions were given as to the diameter of the central hole drilled in the test piece; he used a hole ¾ in. in diameter and indicated that increasing this diameter gave higher results. Hothersall[2, 5] also used a ¾-in. hole in his work, but neither author gives a specific figure for the hole diameter of the die. If the test piece fits too tightly in the die there is danger of binding, and if the fit is too loose concentration of stress at the outer edge of the junction of deposit and basis metal will result in a low value for the adhesion.

Hothersall reported an adhesion value of 56,200 lb. per sq. in. for nickel deposited on mild steel, a value considerably higher than the results obtained in the present work up to this point, and it was felt that the discrepancy probably lay in the testing method rather than in the cleaning operation. In the data given in Tables II and III, the relative values of the adhesion figures are precise, it is their absolute values which are in question. In order to study the dimensional variables, tests were run using method No. 4 (4 min.) of Table II on a heat treated steel which had a tensile strength of about 120,000 lb. per sq. in. The data are given in Tables IV, V and VI.

Decreasing the diameter of the die hole and increasing the hole diameter of the test piece led to marked increases in the adhesion values. There seems to be little choice between the two smaller dies, and as there was a tendency for binding to occur in the 1.010-in. die, the 1.020-in. die was used in the further work.

Up to a deposit thickness of 0.098 in. the adhesion values increased rapidly, but the deposit was too thin and tended to fold up into a cup shape. Above this thickness value there was no folding and the overhanging rim of the deposit was sheared off. At the higher thicknesses the values increase slightly, probably due to the greater resistance to shear offered by the increase in thickness. Fig. 9 shows such a sheared deposit.

There are three possible modes in which the deposit may be separated from the basis metal in the Ollard test.

(1) By bending. This is probably the manner in which separation occurs in the original Ollard test, and under which conditions the data in Tables II and III were obtained.

(2) By shearing. This is illustrated by the data for higher thickness in Table V and by Fig. 9.

(3) By tensile separation, whether at the interface, in the basis metal or in the deposit. This is the only condition under which the test will be valid.

Data are not available for electrodeposited nickel, but for hot rolled nickel the ratio of tensile to shear strength is about 1.3, which means that in order to obtain the third type of separation, the cylindrical area subject to shear should be at least 1.3 times the annular area subject to tension. The area in shear $= \pi$ d h where d is the diameter of the test piece (a constant) and h is the deposit thickness (a variable); the area in tension $= (\pi r_1^2 - \pi r_2^2)$ where r_1 is the radius of the test piece (a constant) and r_2 the radius of hole diameter of the test piece (a variable). Applying this to the data in Table V, with a deposit thickness of 0.128 in. the ratio (shear area) ÷ (tensile area) is 1.07, that is, less than 1.3, and the deposit failed by shear. With this hole diameter of 0.75 in., as employed in the original Ollard test, the deposit would have to be at least 0.145 in. thick in order to obtain tensile separation. Rather than going to such a thick deposit it is more practical to increase the ratio (shear area) ÷ (tensile area) by increasing the hole diameter of the test piece and thus decrease the area in tension. Table VI gives the data on this point.

With the low thickness value the deposit folded at the edges, but instead of shearing, the deposit elongated as shown in Fig. 10. With the thicker deposits folding did not take place and the narrow rim of nickel attached to the steel base stretched until a break occurred. These results indicate that the adhesion between the nickel and steel is greater than the tensile strength of the nickel.

In some previous work, the results of which were given by Wesley[6], a tensile strength of 51,000 lb. per sq. in. was obtained for nickel deposited from the same bath as employed in the present work, and this value is appreciably lower than that of 85,000 lb. per sq. in. given in Table VI. In determining the tensile strength of nickel deposits, the direction of the applied load is at right-angles to the direction of crystal growth, whereas in the present case the load is applied in the direction of crystal growth. This variation may explain the discrepancy.

From these results it is suggested that the Ollard test be modified to the following specifications: 0.938 in. hole diameter of test piece, a 1.020-in. die hole diameter, with a deposit at least 0.090 in. thick. The plunger for applying the load should be ⅜ in. in diameter, and have a rounded end.

At the suggestion of T. H. Wickenden, of the International Nickel Co., the following tests were carried out. Duplicate round standard A.S.T.M. specimens were machined from nickel stock and from a nickel-chromium steel; duplicate specimens were also machined from the same materials in the form of the actual Ollard test specimen according to the above specifications. That is, the rim and body of

Deposits

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Research Laboratory, International Nickel Co., Bayonne, N. J.

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the test specimen were formed from the same piece of metal. It was found necessary to increase the thickness of the rim on the nickel Ollard specimens to prevent cupping, and the results are given in Table VII.

If the Ollard method in its modified form gives a true tensile test, the results should agree for each metal, and it can be seen that this is the case with the nickel. With the steel, however, the Ollard values are higher than the tensile strength by about 10 per cent. A safe assumption would seem to be that for nickel the modified Ollard test has the same theoretical significance as the tensile test, and that undoubtedly an explanation can be found for the discrepancy with the steel. However, it can be stated at present that values obtained with the modified Ollard test on nickel deposits can be regarded as true tensile measurements, at least within an error of 10 per cent.

Application of Modified Test

The results obtained to this point were on nickel deposits plated from the usual type of nickel bath, and show a hardness of 160 Vickers. Since many engineering requirements call for a harder type of nickel deposit, tests were run with the modified Ollard test on deposits showing a hardness of 420 Vickers. The following conditions were employed and the results are given in Table VIII. Nickel deposits on cast iron, where the basis metal may be porous, do not cover as well as copper, and so work was also included in which a thin undercoat of copper was employed.

$NiSo_4,7H_2O$ = 180 gm. per liter.
NH_4Cl = 25 gm. per liter.
H_3BO_3 = 30 gm. per liter.

130 deg. F., pH 5.6 (electrometric), 50 amp. per sq. ft., 0.09 in. deposit thickness.

With the copper undercoat, after

TABLE IV

Ollard Adhesion Values on Steel. Variation in Die Hole Diameter. (Deposit Thickness Greater Than 0.08 In.)

Hole Diameter of Test Piece, In.	Hole Diameter of Die, In. 1.010	1.020	1.030
0.750	37,500	33,600	14,500 lb. per sq. in.
0.813	46,000	46,300	—
0.875	73,000	51,200	—
0.938	77,000	74,500	22,000 lb. per sq. in.

TABLE V

Ollard Adhesion Values on Steel. Variation in Deposit Thickness.

Hole Diameter of Test Piece, In.	Hole Diameter of Die, In.	Deposit Thickness, In.	Ollard Test Values, Lb. Per Sq. In.	Ratio of Shear to Tension Area
0.75	1.020	0.065	20,200	0.49
0.75	1.020	0.084	27,500	0.67
0.75	1.020	0.098	34,500	0.79
0.75	1.020	0.118	35,500	0.98
0.75	1.020	0.128	36,500	1.07

TABLE VI

Ollard Adhesion Values on Steel. Variation in Deposit Thickness.

Hole Diameter of Test Piece, In.	Hole Diameter of Die, In.	Deposit Thickness, In.	Ollard Test Values, Lb. Per Sq. In.	Ratio of Shear to Tension Area
0.938	1.020	0.078	69,000	1.98
0.938	1.020	0.087	85,000	2.54
0.938	1.020	0.100	85,000	2.97
0.938	1.020	0.121	85,000	3.66

TABLE VII

Tensile and Ollard Tests on Nickel and Steel

Material	Lb. Per Sq. In. Tensile Test	Ollard Test
Nickel	79,000	78,200
Nickel	79,000	79,800
Steel	128,000	141,200
Steel	128,500	141,700

TABLE VIII

Adhesion Values, Modified Ollard Test

Basis Metal	Cleaning Treatment	Lb. Per Sq. In.
Steel (120,000 lb. per sq. in. tensile strength)	Table II, method No. 4 (4 min.)	94,500 91,700 Breaks in steel
Cast iron	Table III, method No. 3	24,400 26,900 Breaks in cast iron
Cast iron	Table III, method No. 3, then 0.0002 in. deposit from copper cyanide plating bath; cold water rinse, 30-sec. dip in 10 per cent HCl (by weight) at room temperature, cold water rinse.	6,850 7,350 Break in copper layer
Cast iron	Table III, method No. 3, and copper deposit. Cold water rinse. Anodic, ammonium citrate solution, 10 amp. per sq. ft., room temperature, 60 sec. (Hothersall.[9])	7,150 7,250 Break in copper layer

TABLE IX

Etching Treatments for Other Basis Metals

Basis Metal	Etching Treatment
Ni-Mo steel	Anodic in 25 per cent (by weight) H_2SO_4, 200 amp. per sq. ft., room temperature, 5 min.
Ni-Mo cast iron	Anodic in 25 per cent (by weight) H_2SO_4, 500 amp. per sq. ft., room temperature, 3 min.

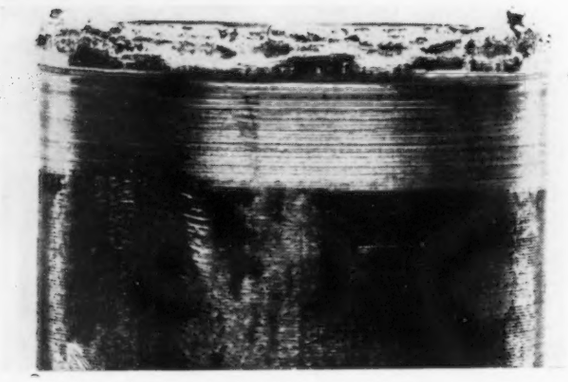

FIG. 9—Ollard test piece showing sheared deposit. At 2¾ diameters.

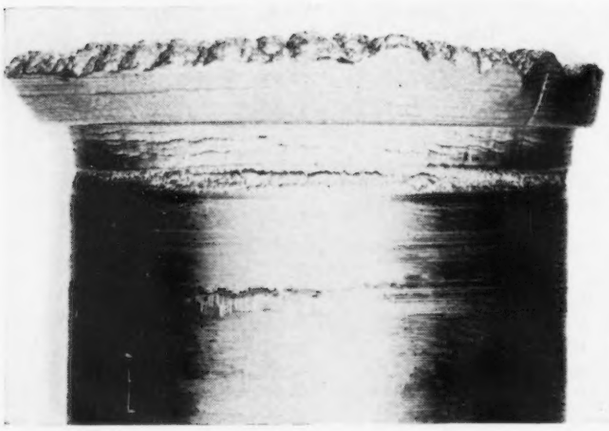

FIG. 10 — Ollard test piece showing elongated deposit. At 2¾ diameters.

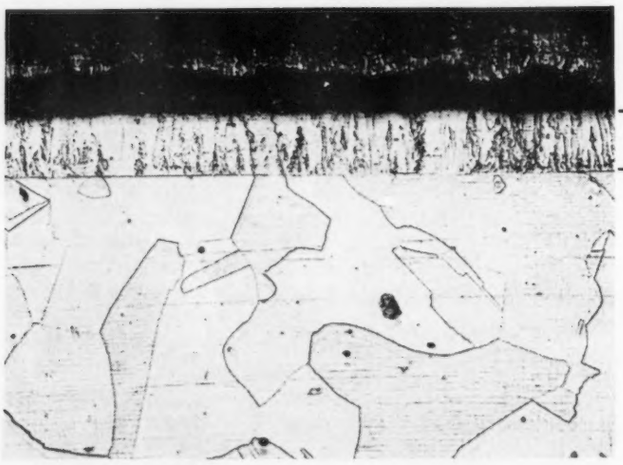

FIG. 11—Nickel deposited on unpolished annealed nickel. At 100 diameters.

FIG. 12—Nickel deposited on polished annealed nickel. At 100 diameters.

the break occurred, copper was found on both the cast iron and on the nickel. There seems to be no data available on the tensile strength of copper deposited from the cyanide bath, but the present results would indicate that this strength is quite low, and probably of the same order of magnitude as the adhesion values.

Adhesion of Ni to Ni

In commercial work it is sometimes necessary, in building heavy deposits, to remove the cathode before the final thickness is reached and then to replace it in the bath and continue with the deposition. In order to devise a simple procedure for such an operation, the following work was carried out.

A steel Ollard test piece was cleaned by method No. 4 (4 min.), Table II, and then nickel plated to a thickness of about 0.012 in. from the regular plating bath. The specimen was then removed from the bath, washed and allowed to stand in the air for 1 hr. It was then rinsed and placed in the plating bath as anode at 10 amp. per sq. ft. for ¾ hr. The current was then reversed and the piece made cathode at the same current density for 1 hr., after which the current was gradually raised to 50 amp. per sq. ft. over a 2-hr. period. It was plated under these conditions to a total deposit thickness of 0.090 in. The piece was then machined to give a length of 1.520 in. on the cylindrical surface; as the first deposit was 0.012 in. thick, this would mean that the applied load would tend to effect separation at both the steel-nickel and at the nickel-nickel interfaces. The adhesion value, under the modified testing conditions, was 65,000 lb. per sq. in. The break was irregular; over part of the surface at the steel-nickel interface and at other parts at the nickel-nickel interface. This method apparently gives very satisfactory adhesion.

In certain cases, such as the repair of worn parts where part of the basis metal is covered with a previous nickel layer, or where it is desired to deposit nickel on a nickel base, a cleaning procedure which will give good adhesion is desirable. Such a procedure has been described by Hothersall[7], and he was able to obtain excellent results on mild steel, Ni-Cr structural steel and nickel. The procedure has been used here as method No. 2, Table I.

In order to study this procedure in more detail a piece of nickel was annealed for 1 hr. at 1600 deg. F. One face was then polished, through the 400 wheel, and the piece plated in the

regular nickel bath at 10 amp. per sq. ft., after being cleaned by method No. 2, Table I. After plating, a heavy copper layer was deposited over the whole of the piece. Fig. 11 is a cross-section through an unpolished side, Fig. 12, through the polished side. It can be seen that the deposited nickel was influenced by the grain structure of the nickel basis metal through the 0.030-in. of the deposit. Repeated at a current density of 25 amp. per sq. ft., there was only slight indication of continuation, and at 50 amp. per sq. ft. no indication was obtained.

This condition, of reproduction of the micro-structure of the basis metal by the deposit, has been realized in a number of cases by various workers in the field and represents an ideal case of perfect adhesion. Hothersall[6] obtained continuation of nickel deposited on electrolytic nickel, and any doubts as to the possibility of obtaining this case of perfect adhesion are dispersed by the present work. From the evidence of the adhesion tests and the continuation of basis metal structure, Hothersall[8] has concluded "that when nickel is deposited on a clean, etched surface of pure iron, it follows for a time the orientation of the crystal lattice of the iron and the two metals are held together by atomic forces. With metals of commercial purity the evidence of adhesion forces, approaching or exceeding the tensile strength of the metal, suggests that this type of bonding applies generally to electrodeposits of nickel on clean surfaces."

Satisfactory etching treatments for other basis metals, after the preliminary procedure already described, are given in Table IX.

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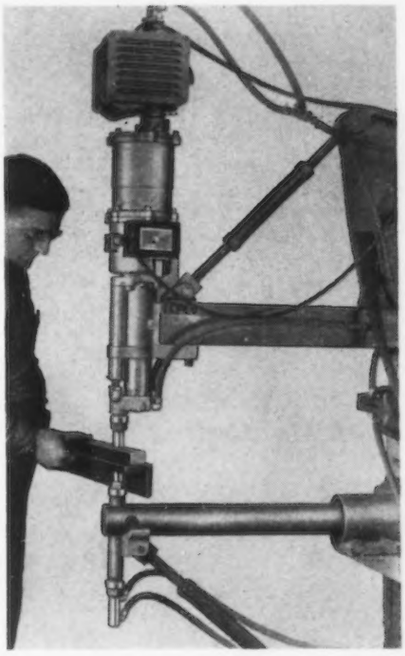
Heavy Sections Electrically Forge-Welded

FORGE-WELDING is a new process of heavy duty electric resistance welding for spot welding heavy steel and iron sections heretofore considered impossible to weld with conventional equipment. The process as announced by Progressive Welder Co., 3017 East Outer Drive, Detroit, has the promise of opening up new fields for resistance welding in the fabrication of structural steel assembly and of heavy sections generally.

In principle the process harks back to one of the earliest forms of welding: heating, forging, re-heating, re-forging, etc. In comparison, however, the new process is extremely rapid. Typical of work now being handled is welding of two pieces of ⅜ in. stock to a 1 in. section, or welding together two 1 in. sections.

Resistance forge-welding consists of first applying pressure to the work, then interrupted current, and finally super-imposing a hammering action on the electrode. Under high pressure and with sufficient heat, the surfaces of work are brought into such intimate contact that when additional impact-pressure and intermittent heat are applied a forged weld of superior quality is obtained.

The equipment recommended consists of a standard pedestal-type welder having a new type of compound action Hydro-Booster mounted on the upper arm immediately above the welding electrodes. The booster



has two chambers, one above the other, each capable of receiving air under the usual 80-90 lb. factory line pressure. The piston of the upper chamber can act on the top of the lower piston to increase the resultant welding pressure. In this manner, the lower piston supplies the necessary initial pressure, while the upper piston, acting independently, can superimpose the hammer blows required for the operation. Thus, the initial pressure of 2000 lbs., together with sufficient heat, brings the surfaces of the work into intimate contact, and the combination of interrupted heat and intermittent hammering (approximately 1000 lbs. per blow) combine to complete the weld. A special timer is used which can control the sequences of operation for any condition yet encountered. Also a special alloy type of electrode has been developed to withstand the high pressures and heat.

Size of spots vary, according to the metal and its thickness, but generally on work totaling 1½ in. thickness the spot will be approximately 1 in. in diameter near the surfaces with the diameter about 50 per cent larger as it approaches the mid-section—typical of forging action.

To suit varying metal thicknesses, types of alloys, etc., the number of heat interruptions and "forging" blows can be varied. On certain types of work, interruptions of heat and application of "forging" pressure will be synchronous, while on other types of work heat and pressure is applied alternately,

Portable spot welding guns can be used for resistance forge-welding—primarily on work up to about ½ x ½ in. With such equipment the process differs in that pressure is supplied in two stages: first, a welding or contact pressure, then a heavy squeeze or forging pressure. Otherwise the operation is essentially the same. The reason is, of course, that with the portable gun, the Hydro-Booster head would be too cumbersome.

QUIET Gears for Tractors

CATERPILLAR TRACTOR CO. has evolved a production process for its gears which insures quietness through accuracy, the result being longer operating life.

Included in the processing of Caterpillar transmission gears are such unusual features in the tractor field as: (1) Shaving of all gears as a "plus" finishing operation; (2) purchasing of all gear steel on the basis of test samples from each heat; (3) double—200 per cent—inspection for hardness; (4) complete record of every gear kept in files. Serial number will tell even the position of that gear in the furnace for heat treating; (5) virtually continuous dynamometer life-testing of regular production gears.

All gear forgings are delivered with centers punched and OD trimmed concentric with the bore with the punched bore held to close tolerances consistent with size of gear. Immediately after annealing, the forgings have their bore and internal splines semi-finish broached in one pass. In subsequent operations, the pitch diameter internal splines are then used for locating, so that all machining is in relation to the fit of the gear on the shaft.

On the turning, facing, and forming operations which follow, the gear blanks for instance are mounted on spline arbors, locating from the pitch diameter of the splines, effectively reducing run-out.

Gear cutting operations consist of a combination of rough hobbing, semi-finish shaping, and finish shaving. Even on gears in which interferences prevent complete tooth hobbing, some amount of hobbing is done to reduce time required on the shapers.

Most of the Caterpillar transmission gears today are of 4820 steel, carburized gears being desired for their combined wear and shock resistance characteristics.

Machining sequence (3rd and 4th sliding gear):

(1) Anneal; (2) broach bore and semi-finish spline (horizontal broach); (3) R & F turn, form radii, chamfer and face gears, turn, form groove and stamp (Fay automatics); (4) face both ends of hub and chamfer bore (2-spindle J & L); (5) rebroach spline to remove burrs. Caterpillar hydraulic press with Colonial broaches; (6) rough hob teeth (Barber Coleman hobbers); (7) rough shape teeth (Fellows gear shaper); (8) finish shape gear teeth, leaving about 0.002 stock (Fellows gear shaper); (9) round teeth (Cross); (10) shave teeth (Michigan rotary gear finisher); (11) burr; (12) check heat, stamp, and stamp serial number; (13) carburize; (14) rebroach splines (removing 0.002 to 0.003); (15) harden and wash, draw, clean, and test; (16) grind bore (Heald grinder).

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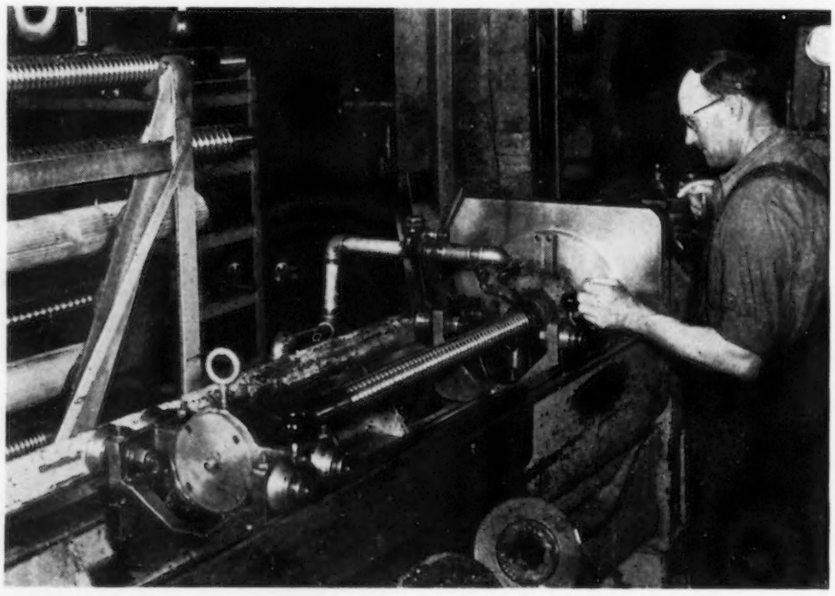
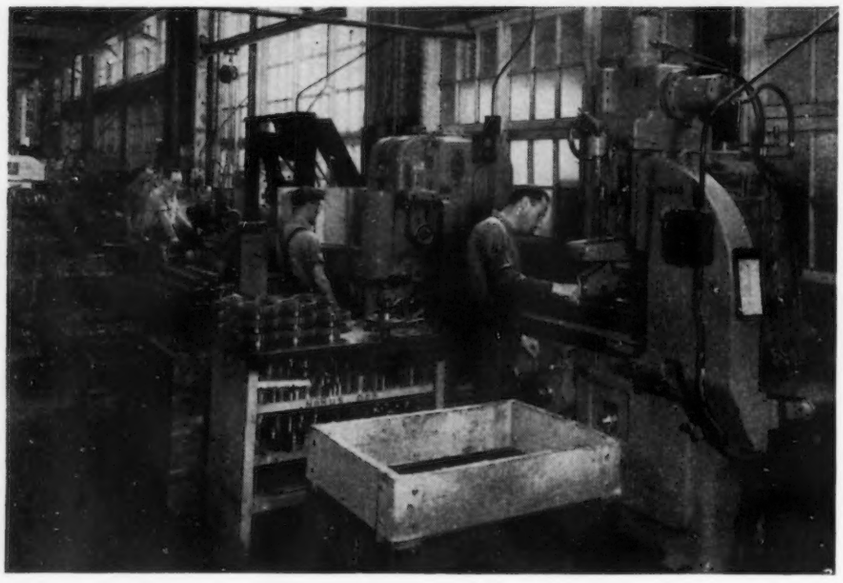


GEARS are finish shaved wherever possible. Rack type Michigan at right; Michigan rotary at left. Caterpillar gets 40,000 5-pitch gears per sharpening of the rack.



FORGINGS are held so close that splines can be semi-finish broached in one pass in the rough forgings.

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A.I.S.E. Debates Production Problems

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A WINDY and cold Chicago was host to a record registration of the Association of Iron and Steel Engineers last week, meeting for their 36th annual convention and exposition. All activities were under one roof, the Stevens Hotel, and some 35 exhibits were laid out for inspection and 27 technical papers were presented in the four days of sessions.

At the Tuesday morning business meeting, the following new officers were announced to serve for the year 1940. President—W. A. Perry, superintendent of electrical and power departments, Inland Steel Co.; 1st vice-president—T. E. Hughes, superintendent of maintenance, Carnegie-Illinois Steel Corp.; 2nd vice-president—F. E. Flynn, district manager, Republic Steel Corp.; treasurer—C. L. McGranahan, assistant general superintendent, Jones & Laughlin Steel Corp.; secretary—J. L. Miller, assistant chief combustion engineer, Republic Steel Corp.

On Tuesday the technical activity was centered in mechanical and electrical problems of steel mill operation and in welding technique. On Wednesday morning the engineers attended simultaneous sessions, one dealing with combustion problems and the other concerned with operating practice.

In the former session, one of several interesting papers was by C. L. Labeka, plant metallurgist of Pittsburgh Steel Co., on "Effects of Soaking Pit Operation Upon Steel Conditioning." Mr. Labeka pointed out that in the open hearth pit, improved mold preparation, better pouring practice, the use of big-end-up molds, equipped with a hot top, all have contributed to a better ingot practice.

It has only been lately that the same interest and control has been applied in the blooming mill. Formerly, the open hearth and blooming mills existed as two separate, distinct units, each one more or less criticizing the other. When a heat rolled very well, the open hearth operators were told that they had done a good job. However, when a heat cracked up pretty badly in the rolling mill, the open hearth melters and pit men were criticized for making a bad heat. It is true that some of the heats were not normal and bad rollings could be attributed to faulty open hearth practice; however, it is also true that the blooming mill was not right in every case. There were times when cold ingots were charged into hot pits, or in order to get the tonnage up on a certain turn, steel, which had not been given sufficient soak, was rolled.

It was only by very thorough observation and patient work that certain fundamental conditions were found which proved without a question that standard practices had to be set-up and followed. Just as in the open hearth, help had to be given the soaking pit heaters and blooming mill operators. When an abnormal heat is noticed in the open hearth today, one of the functions of the open hearth observers is to transmit all the information they can to the blooming mill. The blooming mill observers, the soaking pit heaters and the blooming mill operators must know the type of steel they are dealing with in order to better judge how the heating and rolling of the ingot should be properly made.

Since the open hearth and blooming mill are so closely related and the condition of the ingots as they are charged into the soaking pits does have a decided effect upon subsequent defects in the rolled bloom or bar, Mr. Labeka examined some of these conditions to see how they affect the surface characteristics. These factors are by no means all of the conditions which may affect the ingot, but they should point out that only under rigid control and very close cooperation with the open hearth can the blooming mill be expected to yield a satisfactory product.

In the open hearth it has been possible to maintain the deoxidation of the heats within very close limits. This closer deoxidation practice, together with a better knowledge of temperature control and pouring practice, has enabled the open hearth operators to control rimming and capped steels so that within certain limits various thicknesses of skin can be produced.

In examining the surface of test bars, it is evident that the thicker skinned ingots with proper soaking pit and rolling practice will yield bars relatively free from surface seams. It is also very evident that the exceedingly thin skinned ingots are conducive to surface seams, according to Mr. Labeka.

Surface blowholes are small cavities resulting from the trapping of evolved gases in the metal during solidification.

This is an ingot defect which can lead to more serious results than thin skin. It was found that in the soaking pit operation, oxidation of the ingot surface causes sufficient scaling which exposes these blowholes to the pit bases. These oxidized blowholes will not weld upon rolling and short, choppy seams will inevitably result on the rolled bars.

This is a condition for which it would be very easy to lay the blame

A. I. M. E. members line up to register at Hotel Stevens

upon the soaking pit heater's shoulders. But rather than face the high conditioning costs and greater scrap losses it is far better for the open hearth to prevent these surface blowholes with rigid control even at a slightly increased cost. There is no question that this control will more than compensate for the greater increase in chipping costs and scrap losses.

Special care must be taken of delivery or track time. This time is generally taken from the time the heat is finished pouring to the time the heat is charged into the soaking pits.

Capped and rimmed ingots when stripped at the open hearth are exposed to the cooling effect of the atmosphere and if the delay before charging into the pits is appreciable, conditions arise which make it practically impossible to get good surface on the rolled bars. even under good soaking pit operations.

In handling thin skinned, capped ingots, it was found that if the ingots, after stripping, were delayed in charging, fine hair-line horizontal cracks invariably resulted. These ruptures in most cases were superficial but it was found that at times, what appeared to be a superficial skin crack would extend as deeply as ½ in. In cold weather the rapid chilling effect of the thin skin accentuates these skin ruptures. These cracks become oxidized in the soaking pits and will not weld completely. This will, of course, lead to bloom cracks and many seams on the rolled bars. The best practice is to charge these thin skinned ingots as hot as possible into the soaking pits and it is not good practice to strip the ingots and bank this type of steel while hot since in cooling down to room temperature, cooling strains will be set up which cause these fine skin ruptures.

Where delays are inevitable, the soaking pit heaters should be notified of this ingot condition and, although they cannot "rescue" these ingots, they can, by careful heating, prevent these cracks from becoming larger due to a rapid thermal change to the ingot skin.

The thicker skinned, capped and rimmed ingots do not show this skin cracking as readily as the thin skinned grades. It was also found that this type could be heated faster in the soaking pits with no serious damage to the ingot surface.

It can readily be seen that slow track time and other delays in charging the ingots into the soaking pits can lead to very poor surface quality, and it is only by a synchronized plan between the open hearth and blooming mill that good results can be obtained.

When charging ingots that are cooler than normal because of delays or when charging steel that is cold, such as banked ingots, the ingots should never be charged into a hot pit. Whereas in rapid cooling, strains are set up which yield skin ruptures, too drastic a change in temperature, which occurs when a cold ingot is placed into a hot pit, will also give skin cracks.

The steel ingot, susceptible to many of the defects mentioned, is now charged into the soaking pits. In the pits a good heat can be ruined and an abnormal heat at times can be saved. All this can happen in one department upon which a great deal depends, since

conditioning costs and the behavior of the semi-finished bars in the finishing mill operations are affected by the methods of heating.

The coke bed should be of a constant depth so that the ingots may remain upright in the pits. This is essential on lower carbon grades since the ingots have not entirely solidified if fast delivery has been made and the extent or position of the pipe may be changed. In all cases, however, the ingots should be upright and away from the walls since they will have a better chance to heat because more surface is exposed to the pit atmosphere. They should also not be placed in the center of the pit where direct impingement of the flame can cause damage to the ingot surface.

As previously mentioned, the pits should be at a temperature approximately that of the ingots to be charged

in order to keep skin cracking down to a minimum.

Uneven temperature in an ingot can lead to bad surface results. In the rolling operation the temperature has a great influence upon the plastic flow of the metal and it is very evident that an uneven temperature will cause an uneven rate of metal flow. If rather heavy reductions are taken, such as is common in three high blooming mill operation, this uneven rate of flow will cause tears in the ingot. This type of a heating condition is not always the fault of the heater.

The exhibitors do a little dancing for relaxation

They listen to authors reading technical papers ↓

In two-way fired soaking pits using producer gas as a fuel it is a difficult task for the heater, who generally has two or three blocks of pits to heat, to maintain a uniform temperature. Fluctuations in the producer gas analysis are often a sufficient detriment in controlling an uneven temperature.

If the pits are not deep enough to allow uniform heating for the entire length of the ingot, cracking may result when the ingot is being rolled. It has been proved that butt cracks on big-end-up ingots which are charged hot-top down may result if the pit is not deep enough to thoroughly heat the entire length of the ingot.

Modern pit design has without a question contributed a great deal towards promoting better control and better quality at a less operating cost.

Some of the factors which affect rolling operation are the amount of draft, the analysis of the steel, the temperature and the speed of rolling.

The greater the speed of rolling the more superficial the work and the greater the increase in defects caused by tears in the ingots.

It was found that rolling temperatures play quite an important part. If the ingot is not heated to a sufficiently high temperature to render the metal plastic enough to flow uniformly, ingot tears will result on the sides opposite from the roll faces.

Mr. Labeka went on to say that the problem of conditioning is indeed more complex than many may imagine. This problem for the chipping foreman does not resolve itself into simply chipping out the surface defects, but requires them to have a very thorough knowledge of the type of steel they are dealing with, the surface requirements demanded for that particular grade, what type of finishing mill is to further process the steel bars and above all how much money can be spent per ton to keep the price structure in line.

Thorough conditioning of the bars is only possible when the scale has been removed by pickling. When surface requirements are very rigid such as in the manufacture of cold heading wire or rods, or in seamless tube manufacture it is necessary to pickle the bars if a good thorough chipping job is desired.

When chipping thin skinned capped or rimmed ingots, deep cuts cannot be taken since it is possible to break into the core of the steel bar. Upon further rolling such as in a rod mill, many small surface seams will occur. Excessive corner chipping on this type of bars makes it impossible to achieve good rollings in the finishing hot mills.

On killed grades, deep surface seams require deep chipping and unless the edges are rounded, there is always danger of laps being formed in further hot rolling. This type of chipping is especially undesirable on rounds for seamless tube manufacture that are to be processed on very fast piercing mills.

Pit Control

Another paper in the morning combustion engineering division dealt with "Soaking Pit Control," prepared by M. J. Boho, sales engineer of Hagan Corp.

Mr. Boho pointed out that as compared with pit practice prior to say five years ago, present-day pit designs produce more and better heated ingots at lower cost. Surface imperfections in slabs and blooms, attributable to improper ingot heating, can be practically eliminated because of the more precise control of furnace temperature available with the new pits.

Over 150 new soaking pits of latest design have been paying their owners remarkable dividends. These newer units have been built in several different shapes—round, square, and rectangular. In one type, fuel enters the bottom of the pit and flue gases are exhausted at the sides. In another, fuel enters at the sides and flue gases exhuast from the bottom. In another fuel enters and flue gases leave the pit from the same side, while in still another, the exit and inlet ports reverse at intervals. Fuels used include natural gas, coke oven gas, blast furnace gas, and mixtures of blast furnace gas, with one of the other two. In one case, a mixture of all three is used.

And Then →

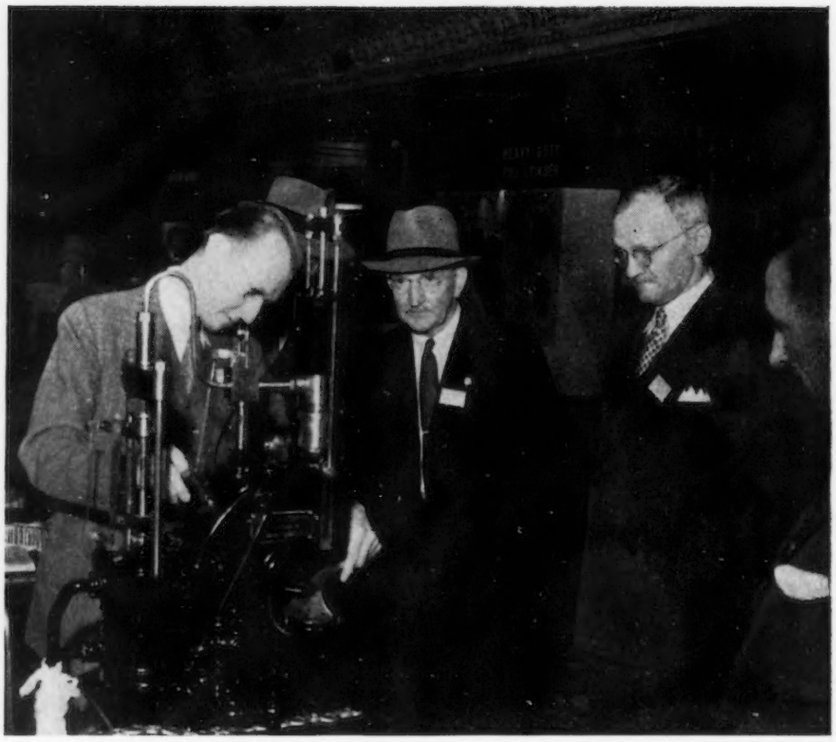
In still others, oil, tar, and producer gas firing are used. While different in construction and method of operation, all of these pits have one thing in common—they all include automatic control as an integral part of the installation. These controls permit study of pit procedure to determine best operating conditions. By maintaining these best operating conditions continuously, the automatic control has helped achieve the success the newer pits enjoy over the old.

The heater operating the soaking pit is continuously interested in three factors other than the physical handling of the steel ingot. These are "rate of heat input," "fuel-air ratio," and "rate of flue gas removal" or "furnace pressure." In this respect, his problem is quite like those encountered in the operation of other type of metallurgical heating furnaces. The range over which he must operate his soaking pit, however, is much greater.

The rate of heat input to the modern soaking pit can be controlled by primary variation of the fuel flow or the air flow since fuel-air ratio regulation is always part of the control equipment. If the heat input, or as it is more commonly called "temperature," control varies the rate of fuel input, the ratio control proportions air flow. If the heat input control varies air flow, the fuel-air ratio regulator adjusts the fuel. For variable B.t.u. fuels, the second method is to be preferred as changes in calorific value are felt immediately by the B.t.u. correcting mechanism and compensated by a variation in flow even before a temperature change takes place.

Control of heat input by variation of air flow has another advantage in that a safety factor is present because on loss of air, due to fan failure or some other cause, fuel is automatically reduced in proportion by the fuel-air ratio control, thereby lessening the danger of explosion.

It is known that heat is developed only when fuel and air come in contact with each other at a high enough temperature. If too much air is used, too much of the heat is carried away by the stack in the flue gas and, if too little air is present, some of the fuel is not burned completely. For best results, there is a definite ratio of fuel to air which should be maintained at all times. This ratio is not necessarily constant at all firing rates, but it must be consistent at all times, especially if control of heat input is effected by varying air flow from the temperature control.



Examine and discuss, and buy new equipment ⟶

An important feature in fuel-air ratio control for soaking pits is a means for adjustment to slightly increase the relation of air to fuel as firing rate is decreased. This becomes more important as the pits become larger and more heavily insulated, and the spread between maximum firing rate and that necessary to supply radiation losses becomes greater. In order to completely burn fuel, it is necessary that the particles of fuel and air come into contact with each other. This contact is a function of velocity and turbulence at the burner. Since the velocity with which fuel leaves most burners is a function of firing rate, this velocity and turbulence decreases and may become very low at turndown. When this happens, the flame tends to become smoky and it is necessary to supply more air to clear up this condition. The increase in excess air compensates for the decreased turbulence by providing more air particles for the fuel to contact. In addition to this factor, an increase in excess air tends to increase the volume of the products of combustion and to lower their temperature, with the result that heat can be transmitted by conduction to all parts of pit.

The pressure within the pit chamber is an indication of the balance between the rate of air and fuel input and the rate of gas removal. With the pit in operation, an unvarying furnace pressure indicates that flue gases are removed as fast as they are formed. An increasing pressure shows to slow a rate, and a decreasing pressure too fast a rate of removal. A regulating device designed to feel this pressure can be arranged to open the damper if the pressure increases and to close the damper if the furnace pressure tends to drop. By properly operating the outlet damper, the opening can be made proportional exactly to the requirements and the furnace pressure can be kept at a constant value at all times.

Mr. Bolo went on to point out that when furnace pressure control was first applied to heating furnaces generally, it was justified by the savings in the fuel effected by elimination of air infiltration through leaks in the setting and the reduction of air flow through open ports around burners at low firing rate. In the modern soaking pit, this problem of air infiltration is minimized because of the steel encased construction and the use of closed forced draft systems of air supply. On the modern soaking pits, there is, however, a greater reason for this pressure regulation. If the outlet damper were adjusted for maximum firing rate and the firing rate reduced, the gases would tend to seek the path of least resistance and short circuit directly from the firing to the outlet port due to excessive draft at the lower firing rate. The steel ingots and por-

tions thereof directly in this path would be overheated, while the rest of the charge would be underheated. Obviously, an undesirable condition. By continuously adjusting the damper openings to match the firing rate, the hot gases of combustion tend to completely fill the pit cavity and envelop the ingots at all times, resulting in more even and faster heating. The point from which to control furnace pressure, for much the same reason as with temperature control, depends entirely on the pit design and the method of firing. It is conceivable that it might, in some cases, be desirable to vary the furnace pressure in accordance with the firing rate for better application of heat to the ingots.

As a matter of fact, one manufacturer of soaking pits has made several installations where no attempt is made to maintain a constant pit pressure. The operation of the outlet pit damper is coordinated with the firing rate in such a manner as to produce the desired heating effect with regards to all of the ingots in the pit with no consideration of the actual furnace pressure.

*For other description see THE IRON AGE, Oct. 13, 1938.

Mechanical Scarfing

A most interesting paper in the Wednesday morning session on operating practice dealt with "Hot Scarfing of Billets, Blooms and Slabs," prepared by E. A. Doyle of Linde Air Products Co.

Mr. Doyle directed most of his attention to the Lin-de-Surfacer steel conditioning machine.* He first stated that in the short period of a few years the traditional method of surface defect removal by chipping has been largely supplanted by the flame-conditioning process.

While the early hand-deseaming blowpipes were somewhat crude compared to the modern product, they made it possible to turn out a more satisfactory conditioning job at greatly increased speed and at lower cost.

By continuous development work on the refinement of the apparatus, gas consumptions were reduced, quick starting devices were produced, and means were developed to eliminate undesirable fins.

These early successes induced the service and development engineers of the Linde Air Products Co. to turn their attention to the development of mechanical means of removing surface defects by the oxy-acetylene process from ingots, blooms, billets, bars and slabs, in either the hot or cold condition.

Consultation with steel operating men and engineers indicated a unanimity of opinion with respect to the desirability of mechanizing the flame-conditioning process, as this would obviously permit surface defect removal right in the rolling train without loss of time or temperature.

After extensive and costly research the first Lin-de-Surfacer steel conditioning machine was ready to be demonstrated.

The initial demonstration was made at a mill of one of the largest steel companies, which was promptly followed by an order for a machine to be designed to remove surfaces from two sides of a bloom simultaneously. The installation was so arranged that after the first two sides were conditioned, the bloom was automatically turned over by a mill-built manipulator, and the other two sides were then scarfed. This machine was made an integral part of the rolling mill equipment, so that the operation became incorporated into the regular rolling cycle.

And get together to tell a few jokes occasionally

And dismantle exhibits and then go home

It is a source of satisfaction that this machine has operated day in and day out since its original installation nearly five years ago.

Mr. Doyle stated that the oxy-acetylene desurfacing process is the only means that may be employed in conditioning hot steel to insure a high-quality product with a low rejection loss. The process can be applied to the conditioning of practically all of the grades of steel that generally are rolled in quantity production, exclusive of certain of the austenitic, stainless or corrosion-resistant steels.

Present machine installations now in continuous service are conditioning materials ranging from ingot iron through the low, medium and high-carbon steels, and have been used successfully on some of the alloys containing low percentages of nickel, chromium and vanadium, including lead-bearing and copper-bearing steels. Carbon steels with high manganese content and high-silicon electric steels are being desurfaced with equal success. The high-carbon steels referred to contain up to 1.36 per cent carbon while the alloys contain up to 3 per cent of nickel or chromium. There is no indication that these are the limits to which the process is restricted. It appears that any steel or alloy than can be readily severed by the cutting-oxygen stream also can be machine-desurfaced.

Any steel that can be deseamed by the process at atmospheric temperatures can likewise be conditioned hot, but the converse is not always true. In some instances, as when alloys of nickel or chromium are to be conditioned, it is essential that the process be done at elevated temperatures. In one case where the cold conditioning of a certain chromium alloy had been considered, the process was rejected because the resultant material had air-hardened and checked. The same operation at temperatures of more than 1900 deg. F. produced completely satisfactory results, and present practice is to condition the alloy at hot rolling temperatures.

Bloom sizes that now are deseamed range from 6 to 12 in. square, and slabs range from 1¾ to 7 in. thick and up to 76 in. wide. Bars 2 in. square or larger also are being conditioned.

The process is not solely confined to rolled material, as ingots have been, and are being conditioned with considerable success. The ingots are deseamed both at atmospheric and stripping temperatures by a machine that cuts a limited width across the top surface only.

The machine-desurfacing process is adaptable to the removal of all defects within ⅛ in. of the surface, which is sufficient to remove such defects as the commonly called rolled seams, checks, light scabs and laminations, mill marks, and the like. Practically speaking, however, it is not always economically advisable to cut at depths necessary to remove the deepest defect. General practice in those mills where Lin-de-Surfacer machines are in operation is to desurface each grade of steel to the depth which strikes the right economic balance between loss in yield and processing costs on the one hand, and savings in reduced rejection loss on the other hand. This depth naturally will vary with different materials, but the metal loss is generally about 2 to 3 per cent of the product. When material of more than average degrees of defects is conditioned, the flexibility of the process permits greater depth of cut to be obtained.

The impression may be that the introduction of the process will result in cooling of the material rolled. Actually, the opposite is true. Pyrometer records indicate that the surface temperatures of the material conditioned is increased from 100 to 200 deg. F., depending upon the size of the product, depth of cut and desurfacing speed. This temperature rise is, however, confined to the surface, and tends to compensate for the elapsed time of processing.

Hot mechanical scarfing consistently produces an exceptionally smooth surface without the characteristic ridged appearance of the surfaces skinned by means of chipping hammers or by hand-scarfing.

There are six principal factors that affect the efficiency of the process. These are (1) the composition of the steel, (2) the temperature of the steel, (3) the amount of scale, (4) the height of the nozzle from the surface of the steel, (5) the desurfacing speed, and (6) the rate of oxygen flow. In any desurfacing operation the objective is naturally to strike the best combination of these factors so as to obtain the lowest possible "oxy-metal" factor which is defined as the cubic feet of oxygen required to remove one pound of steel.

With mechanical hot scarfing there is a very decided saving in the cost of gases per ton of steel conditioned. Repeated studies have indicated that hot scarfing results in a direct saving of oxygen of about 40 per cent over cold deseaming and a saving of acetylene of 50 to 75 per cent. To this should be added the saving in both oxygen and acetylene realized through hot scarfing because of the shorter number of preheat minutes or seconds required for hot steel than for cold steel. As the length of the piece being conditioned is increased, the savings in gases become greater. This is because considerably less preheat is required if a piece is conditioned in one length than if it is cut up and the smaller individual lengths are preheated and conditioned separately.

Mr. Doyle made reference also to metal loss, and this condition exists no matter what process is used for conditioning but hot scarfing is the only process that has been given credit for producing an increased yield, even greater than the amount of metal removed.

Open Hearth Design

In the Thursday morning session in combustion engineering an interesting discourse on "Open Hearth Furnace Design" was presented by W. C. Buell, Jr., consulting engineer.

Mr. Buell stated that omitting free cutting steels, stainless steels, certain special grades such as high tungsten, and some forging grades, the entire range of commercial steels to include the S.A.E. grades are successfully and economically manufactured in the basic open hearth plant.

In the great majority of the hot metal plants, steel is usually made in furnaces tapping from 125 to about 220 tons and furnaces approaching the latter capacity appear to offer the optimum economic practice. Above this capacity the various limitations of plant and equipment, particularly as regards charging and teeming, and difficulties with soaking pit and blooming mill schedules, are apt to nullify the advantages of the lower processing cost of the larger furnace units.

Following the start of the steel capacity expansion era which began about 1928 or 1929, a number of furnaces were built to tap more than 200 tons. Such furnaces were usually designed with 48 in. deep baths. Since original construction most of these deep baths have been reduced in depth and the tapping capacity of the furnaces lowered accordingly. Today hearths are seldom found that are much more than 36 in. deep. It was found that if satisfactory steel was to be made in the deeper baths an unduly long processing time was required for reasons which will later be apparent.

The depths of baths as mentioned are their greatest depths. The median depth of metal is usually about 60 per cent and the slag about 90 per cent of the depth values used.

The operators having furnaces tap-

ping 100 to 175 tons appeared to favor metal depths in the bath of from 20 to 32 in. when making low carbons with the majority specifying 28 to 32 in., but when making medium carbons or special steels they indicated a preferred bath depth about 2 in. greater than for low carbon steels.

The operators of the larger tonnage plants are unanimously of the opinion that furnaces having tapping capacities 150 to 175 tons are of the optimum size for satisfactory metal quality and economical maintenance, while several of those operating furnaces smaller than 100 tons express favorable opinions for 150-ton furnaces.

There is no question, according to Mr. Buell, but that relatively deep baths of steel lengthen the refining and finishing periods appreciably. Assuming hearths of equal steel holding volume, it is apparent that the square footage of metal exposed to slag action per ton of steel contained will be greater with shallow baths and less with deep baths. Inasmuch as a tremendous amount of the refining action is accomplished at or near the interface of slag and metal, a relatively great interface area as found with the shallow bath, expedites the refining effect, saving considerable time.

Assuming a similar charge analysis it is obvious the total slag weight and volume must be the same to accomplish similar refining and thus with a deeper bath the thickness of the slag covering the metal will be greater. A thicker slag blanket increases the difficulty of heat transmission from the flame to the metal which means a greater operating temperature with more fuel and increased furnace maintenance cost. The extent to which temperature must be increased from greater slag depth is well indicated by the following typical example. Assume in both cases that the metal at the bottom of two baths is ready for tapping at 2900 deg., and that the hearth refractories have like characteristics as regards thermal resistance. Then in the first case with a temperature drop through 30 in. of metal of 32 deg. and 4 in. of slag at 14 deg., a total of 46 deg., it follows that the temperature of the exposed surfaces of the slag must be at least 2946 deg. In the second case if the metal bath is 48 in. deep the temperature drop will be 43 deg. and through 8 in. of slag, 28 deg. a total of 71 deg., which develops a slag surface temperature of 2971 deg.

While this is only 25 deg. higher than in the first case, it should be recalled that the average temperature of the furnace gases over the bath may be lower than 3800 deg. and thus 25 deg. represents a considerable percentage of the temperature differential or thermal head, available for heat transfer to the bath. Recalling that heat transmission is in the order of the fourth power of temperature differential, it is evident that small difference of temperature will create great differences in heat transmission. Thus with a temperature differential 3100 deg., 2946 deg. or 154 deg. as with the shallow bath, the transfer of heat from flame to slag will be twice as rapid as with the deeper bath condition of 3100 deg., 2971 deg. or 129 deg. differential.

The slag resistance to heat flow is about four times that of molten steel and consequently a thinner slag blanket is a distinct advantage to the speed and economy of the operation.

During investigation of the comparative production values, a factor was quite accidentally developed which seems to offer the men of the steel making fraternity an answer to their oft expressed wish for a single method of qualitatively comparing various phases of furnace operation.

In order to use this comparison it is only necessary to remember the number 215 if the comparisons are desired in net tons, or 192 for a gross ton basis. Now, if this factor is divided by the time of heats in hours (for example by 10 hr. 45 min. or 10.75 hr.) the answer will be (215/10.75 = 20) tons of steel made, per 1000 cu. ft. of hearth volume, per hour. This relation will hold true no matter what the furnace size may be, the grades of steel made, the fuel used or any difference in the practice plane.

Thus the factor offers a simple and easy method of making many interesting comparisons of furnace operation as, for instance, the productive rate of furnaces of different sizes, the effects for furnaces of like sizes working on different fuels or grades of steel, etc.

Open hearth steel making or ingot cost is affected by four cardinal items inherent to the art, and several important secondary factors, which may be listed about as follows:

1. THE FURNACE:
   - a—General design and construction
   - b—Bath depth
   - c—Fuel
   - d—Maintenance and repair
   - e—Control operation

2. THE PLANT LAYOUT:
   - a—Charging facilities
   - b—Abutting department facilities

3. IRON, RAW MATERIAL SUPPLY:
   - a—Quality
   - b—Consistency of iron analysis

4. THE PERSONNEL
   - a—Operating
   - b—Management and Interdepartmental
   - c—Metallurgical
   - d—Mason
   - e—The order of cooperation

It will be noted that these are not "listed in the order of their importance" for the simple reason that each item is of equal importance to the overall scheme of operation if optimum results are to be secured.

It might be well to consider the effects or conditions of these several items on the overall practice.

1. If the furnace has been liberally designed and constructed in accordance with present day knowledge of the subject and the proper size has been selected, then the first important step has been taken reaching towards superior operations.

It is believed that the relatively shallow bath of metal is essential for rapid operation. Thirty inches of metal should be the maximum bath depth for larger furnaces of say 125 to 200 tons capacity, and possibly 24 or 26 in. for those under 125 tons capacity.

It is generally accepted that certain lean fuels, particularly producer gas, are slower as processing media and require a greater heat expenditure than the richer fuels such as oil or coke oven gas.

After a few hundred heats, the best of furnace design and construction will avail little if maintenance and repair is not established and carried out on a plane parallel to that of the original design and construction. Rebuild must be accomplished on the premise that when a furnace is returned to production it must in all respects be as nearly in its original condition as it is possible to make it.

Control of the furnace operation, whether manual, instrumental or in part both, must be on a plane commensurate with that employed in the furnace design and construction, otherwise any advantage accruing from the installation of a good furnace may be totally lost.

Based on a considerable knowledge of conditions in a great many plants, the author felt secure in offering the opinion that in no shop, more than 12 years old, can existing furnaces be redesigned or rebuilt to develop the economies found in most of the new shops constructed within that period.

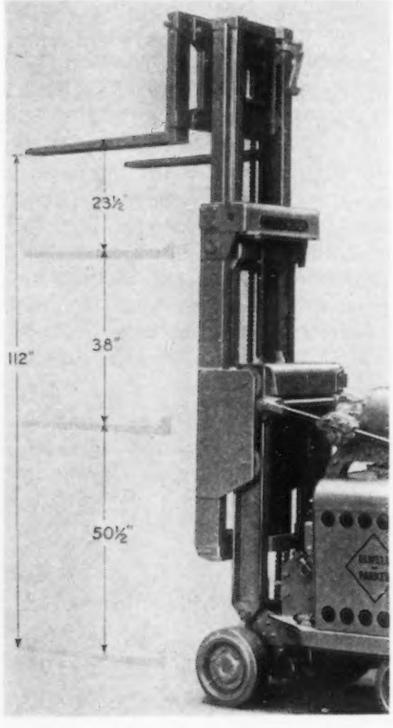
2. Proper layout has an important bearing as regards the productive rate

(CONCLUDED ON PAGE 80)

Material Handling Progress

PROPER utilization of modern material handling equipment is one possible solution to the problem, faced by many plants today, of obtaining higher efficiency and output. The latest developments in such equipment, culled from recent manufacturers' announcements, are described herewith.

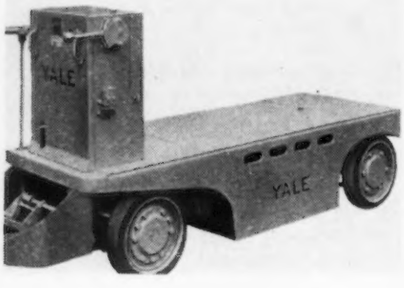
FEATURING an elevating mechanism built in three telescoping sections, the model ERS-3T electric fork truck announced by *Elwell-Parker Electric Co.*, Cleveland, is capable of elevating loads on skids or pallets to three levels. Forks can be raised to 50½ in. on first lift, to 88½ in. on second and to 112 in. on the third. Rate of upward travel is 20 ft. per min. with a 1500 lb. load. With telescoping members lowered, overall height of truck is 74 in., permitting passage through doorways or beneath low overhanging pipes or conveyor systems. Hoist can be tilted 15 deg. backward or 5 deg. forward from vertical and is operated by a separate motor controlled by push buttons. Main driving motor is four-pole, series wound, capable of sustaining 500 per cent overload. It is direct-connected to a free-coasting worm and gear, driving the two wheels nearest load. When lowering load, regenerated power is returned to battery.



Electric Utility Truck

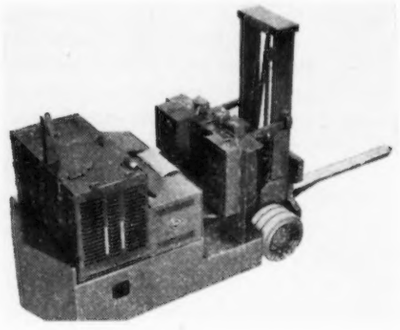
DESIGNED to carry all kinds of miscellaneous items, the model KM-26 electric industrial truck recently introduced by *Philadelphia Division, Yale & Towne Mfg. Co.*, Philadelphia, is the load carrier type, with a capacity of 3000 lb. Frame is welded steel and plate control platform is protected by a bumper. Four-wheel steering and small overall dimensions makes unit especially adaptable for use in narrow aisles and other congested quarters.

Its light weight is an asset where loads must be carried over gangplanks, in elevators of limited capacities, etc.



Ram and Fork Truck

DEMANDS for faster, larger, ram and fork type trucks have resulted in development of the new model F-16, industrial truck by *Elwell-Parker Electric Co.*, Cleveland. Truck is front wheel drive and trail wheel steer type and is built for tilting or non-tilting, and for accommodation of ram, fork or upending devices. Capacity is 16,000 lb. Drive tires are 22¾ x 18 in. and trail tires are 18 x 7 in. Steering is by means of a master lever, controlling the motor powered steering mechanism located on operator's platform.



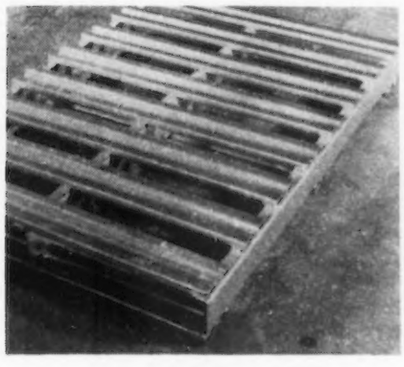
Light Weight Lift Truck

TOWMOTOR CO., Cleveland, has announced a new, low-priced lift truck, the LT-40, developed especially

for handling 1000 to 3000-lb. loads in plants, mills, docks, warehouses and terminals. Built on a 40-in. wheelbase, with a turning radius of 68 in., the unit weighs 3000 to 4000 lb., has an overall width of 35 in. and an overall length (without forks) of 70 in. Interchangeable attachments fit the unit for handling a wide variety of materials. Powered by a 22 hp. four-cylinder gas engine, equipped with degasser and governor, the LT-40 travels at speeds from 1 to 10 m.p.h. Truck has two speeds forward and two in reverse, and a special transmission having only four gear elements. Unit will lift and stack its rated load accurately to heights of 7, 9 and 11 ft., at the rate of approximately 40 ft. per min.

Sectional Face Pallet

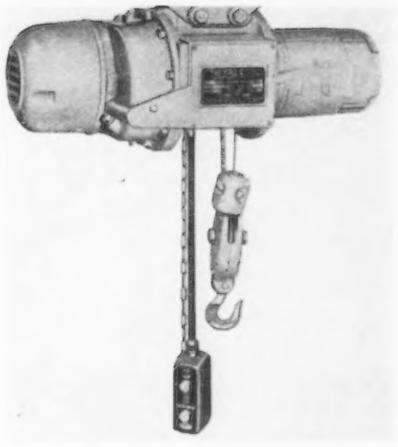
LIGHT weight, without sacrifice of strength, is an advantage claimed for new sectional face, all steel pallet, for use with fork trucks, developed by *Palmer Shile Co.*, 7100 West Jefferson Avenue, Detroit. Pallet is made of



6-in. wide channels with a heavy corrugated center rib. Any specified space may be left between sections. Opening between sections is sufficiently wide on bottom face to allow small roller wheels of hand fork trucks to reach floor enabling short movements to be made with hand trucks.

Hand Lift Truck

THE Transliftor, a new hand lift truck manufactured by *Yale & Towne Mfg. Co.*, Philadelphia, is designed to handle heavier loads on skid platforms with less effort. Providing a positive mechanical selective pump action lift, truck features reduced effort for pump handle operation. Made in capacities from 3500 to 5000 lb., Transliftor is available in either wide or narrow frame models. Both feature hydraulic release checks to prevent dropped loads and torsion type rear links for side sway elimination.

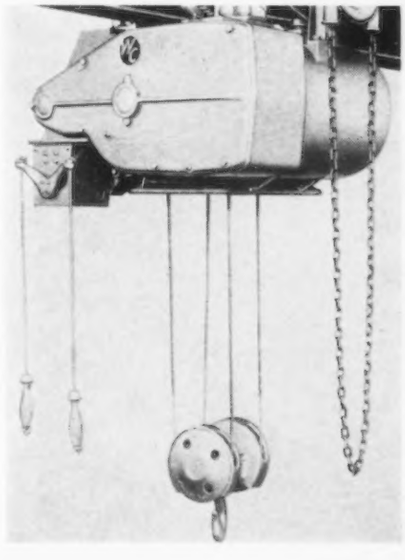


Air Cooled Hoist

LOW cost, air cooled wire rope Load King electric hoists, available in capacities of ¼ and ½ ton, are offered by *Philadelphia Division, Yale & Towne Mfg. Co.*, Philadelphia. Air cooled feature is said to eliminate excess brake heat, permitting heavier work cycles. Other features include standardized interchangeability of repair parts, small overall dimensions and maximum use of roller or ball bearings. Hoists may be operated outdoors.

One-Piece Frame Hoists

PENDENT rope controlled, single speed electric hoists with a one-piece cast frame containing drum, gearing and motor, have been developed by *Whiting Corp.*, Harvey, Ill. Units are made in capacities from 1000 to 15,000 lb., with lifts of 20 to 40 ft. Hoisting speeds range from 14 to 50 ft. per min. From 18 to 30 in. increased hook lift is said to be obtained in these units, as compared with

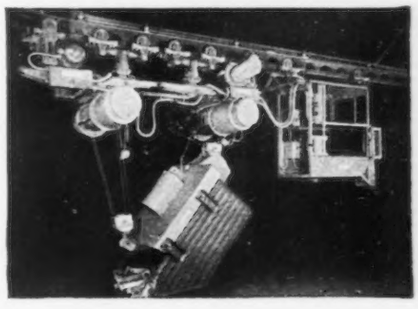


conventional hoists of equivalent capacities. A heat treated steel roller ratchet provides accurate control of brake and gives a substantial reduction in usual pawl and ratchet maintenance costs. Low headroom is obtained by mounting drum parallel with track and allowing hook block to come up alongside drum. This construction prevents any unbalancing when reaching for loads since pull is always tangent to drum.

Whiting is also offering a push button controlled hoist with a welded all steel frame (not illustrated) having the same capacities as the hoist mentioned in preceding paragraph. A cast gear case containing the hoist reduction drive and the load brake is bolted to the main frame. This type features a motor brake as well as a load brake.

Tilting Box Grab

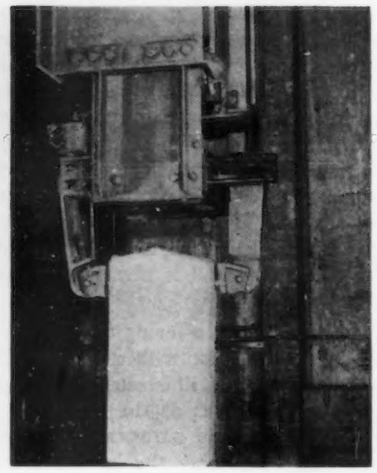
NEW tilting box grab and carrier that picks up boxes, sets them down, or empties them by tilting, has been developed by *Cleveland Tramrail Division, Cleveland Crane & Engineering Co.*, Wickliffe, Ohio. Equip-



ment consists of cab-operated Cleveland Tramrail motor-driven carrier with two independent hoisting units and motorized grab. Pickup of box is through brackets on the box and sliding latch bars in the grab, actuated by controls in the cab. Boxes can be picked up and spotted without difficulty 30 or 40 ft. below carrier. Speed of carrier is 300 ft. per min., and units with capacities from three to five tons are made.

Ingot Grab

FEATURES of motor driven grapple and stiff legged crane are combined in Mansaver 1207 Grab offered by *J-B Engineering Sales Co.*, New Haven, Conn. Stiff leg in this unit hangs from an overhead crane. Grab is supported by a carriage which rides up and down in the leg and can be telescoped into the leg for clearance purposes. Grapple will handle hot in-



gots from 12 to 42 in. wide. Small motor gives grapple jaw a slight entry into ingot after which weight of ingot, acting on the jaws, exerts sufficient pressure to provide a firm grip of ingot.

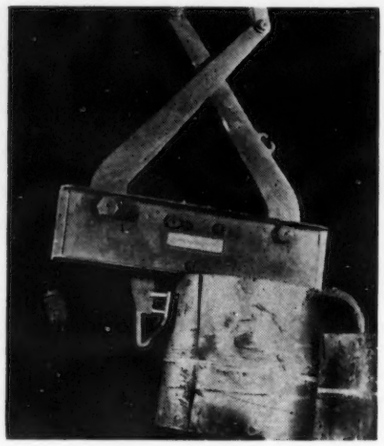
Extension Crane

CRANES with a cantilever extension, which make it possible for the trolley to go beyond the crane runway and move loads into an adjacent bay, were recently installed in Portsmouth, N. H., Navy Yard by *Cleveland Crane & Engineering Co.*, Wickliffe, Ohio. Crane bridge is underslung to enable trolley, when traveling into adjacent bay, to clear under runway girder. Capacity of cranes is five tons and span is 37 ft.

Cleveland Crane & Engineering Co. has also developed wall-type cranes with a horizontal reach of 30 ft. from center of hook to center of runway rails (not illustrated). Capacity is five tons at 20 ft. reach and three tons at 30 ft. Six wheels are provided for jib travel; two for vertical loading, two at base of crane for wall compression loading and two upper wheels for wall tension loading. Cranes are especially suited for operations under heavier traveling cranes or where it is not practical to build a two-track overhead runway.

Crane Tongs

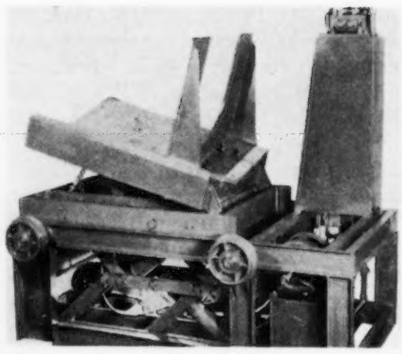
FEWER accidents and less lost time are advantages claimed for Gellert crane tongs for handling ingot molds, die blocks, pipe, wire and various special shapes. In operation, tongs are



lowered on work and clamping is automatic, no chains being required. Lifting capacities range up to 200,000 lb. *Heppenstall Co.*, Pittsburgh, is exclusive maker of these tongs.

Strip Coil Unloader

HYDRAULIC elevating trucks for unloading coils of strip steel from recoiling machine, arranged to run on track at floor level with lower portion of truck being in a pit below floor level, are announced by *Lyon Iron Works*, 542 Madison Street, Greene, N. Y. Truck is the toggle lever type and handles coils up to 46 in. diameter and up to 10,000 lb. weight. Elevated height of platform,

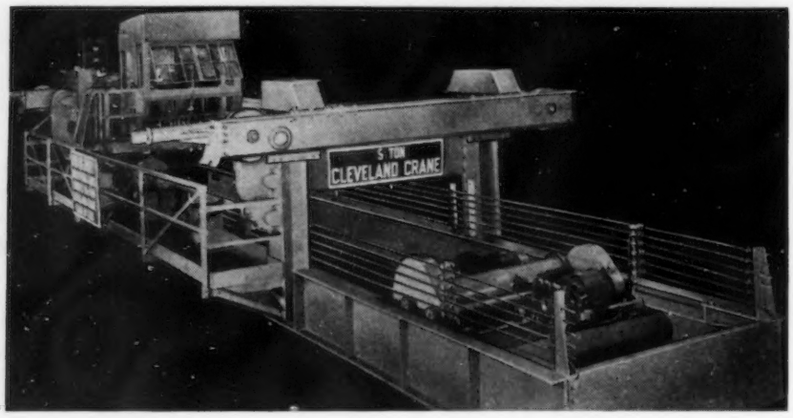


which tilts 15 deg. from horizontal, is 25½ in. A 3-hp. motor driven pump furnishes power for four elevating, one lowering and one tilting hoist.

Totally Enclosed Conveyor

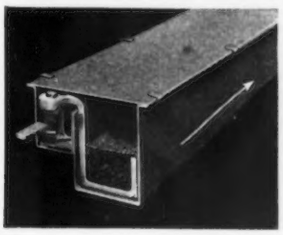
AN improved conveyor of the vibrating type, featuring totally-enclosed design, minimum headroom, and rubber shackled pan mounting with self-contained, patented, reciprocating drive is announced by *Ajax Flexible Coupling Co.*, Westfield, N. Y. Conveyor is equipped with two intakes and a single discharge. Flanges are provided for flexible boots on intake and discharge openings for convenient, dustproof connection to hoppers and chutes. These low headroom

conveyors are available in standard and special lengths up to 50 ft. or more, and widths up to four feet. For long distances, they can be installed in series. Driving mechanism is self-balancing and applies reciprocating motion directly to the conveyor pan, transmission of vibration to surrounding structures being entirely eliminated. Newly developed rubber-bushed shackles connect the supporting springs to pan, resulting in smoother and more uniform action, and making possible higher conveying speeds than heretofore obtainable. Shackles require no lubrication.



Contamination Proof Conveyor

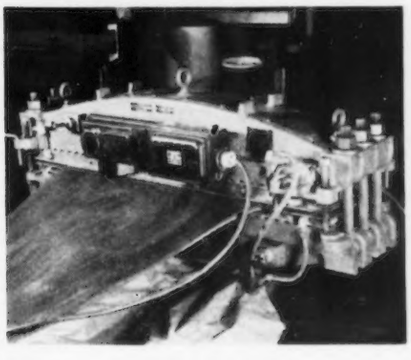
CLEANLINESS and freedom from contamination are assured in the new Redler conveyor manufactured by *Stephens-Adamson Mfg. Co.*, Aurora, Ill. This unit is available in horizontal closed circuit type and features the driving chain moving in a compartment separate from enclosure handling the conveyed material. No dirt or lubricant can enter the carrying run, it is claimed. These conveyors will convey or elevate pulverized, granular, small lump and flaky material in any direction. New design does



not add to overall width or length. Units are assembled from standard sections at factory and are quickly erected at job. They are available in 90 or 180 deg. type circuits and are especially recommended wherever multiple discharge points on horizontal runs are required.

Belt Vulcanizer

NEW vulcanizer developed by *R. F. Goodrich Co.*, Akron, Ohio, and manufactured by *James C. Heintz Co.*, designated as model 36-42, has a platen 12 in. wide and long enough to span 36 in. belt. Vulcanizer can also be used on 42 in. belts when belt is placed at approximately 12 deg. from line drawn at right angles to belt edge. Proper vulcanizing temperature is automatically maintained. Vulcanized splices are said to give a smooth permanent joint, without metallic fasteners. Controls are easily accessible on front of unit.

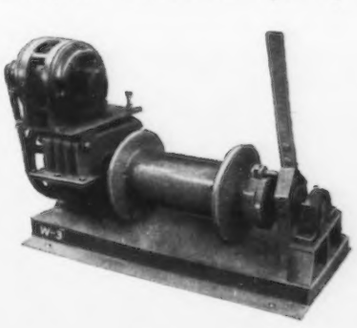


Railroad Car Vibrator

PROBLEM of emptying hopper bottom freight cars is simplified and speeded up by use of new vibrator developed by *Syntron Co.*, 694 North Lexington Avenue, Homer City, Pa. Units are fitted with hooks for attaching to cars and pulsating electro-magnets strike 3600 blows a min. Each vibrator weighs 950 lb., including hook and are usually used in pairs, one on opposite ends of car sides. Units can also be used on large bunkers and storage bins to promote free flowing discharge of contents. Force of vibrating stroke is controllable.

Speed Reducer Winch

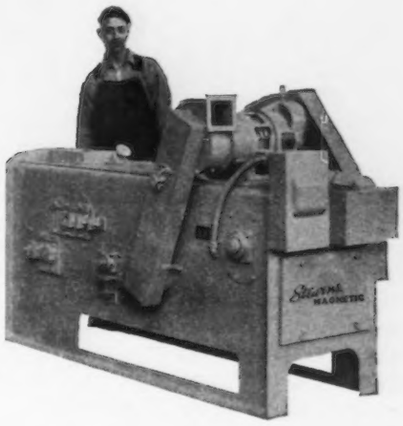
JAW clutch which releases pulling rope when disengaged, is a feature of speed reducer winches introduced by *Stephens-Adamson Mfg. Co.*, Aurora, Ill. Release of rope is par-



ticularly valuable when pulling line must be carried a distance to attach to object to be moved. Disengagement eliminates necessity of reversing winch. Use of speed reducer enables speed of drum to be determined by simply placing proper size sheave on motor drive shaft, since first reduction is through adjustable V-belts. Second reduction is through helical gears inside the cast iron housing.

Magnetic Separators

USE of a.c. current for energizing magnetic field is a feature of type AM magnetic separators newly introduced by *Stearns Magnetic Mfg. Co.*, Milwaukee. This method of energization causes lines of force to change 60 times per sec., while material affected by magnet receives 120 pulsations of constant agitation. This design is said to be especially effective for treating finely ground powdered material which may be contaminated



by impurities, such as oxide, scale, charcoal, silica, etc. Under ordinary conditions, three products can be produced with these units—tails, middlings and concentrates. Removable panels permit inspection of material while separator is operating and a directly attached exhaust fan removes dust from material.

Hinged Conveyor Sections

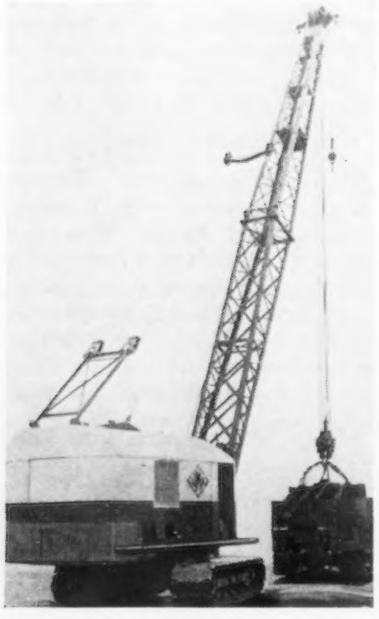
HINGED sections of Metzgar wheel conveyors, made by *Metzgar Co.*, Grand Rapids, Mich., are now available which provide a simple, quick means of breaking a conveyor line to permit passage of trucks or other conveyances without disturbing basic setup of conveyor system. This improvement also makes economically possible the establishing of conveyor lines over occasionally used passageways. Hinged sections can be counterweighted if desired.

6000-lb. Mobile Crane

ABILITY to lift and swing a 6000-lb. load 50-ft. from machine without danger of tipping or breakdown is claimed for new Supercrane introduced by *General Excavator Co.*, Marion, Ohio. Capacity is ¾ yards. Features include 15 m.p.h. speed, hydraulic steering, lowering of loads through gears and auxiliary precision brake. One motor and one set of controls are employed for all operations.

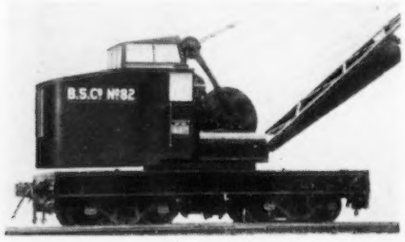
60-Ton Crawler Crane

HEAVY duty 60-ton crawler cranes for handling heavy loads with fractional precision have been added to line of cranes made by *Lima Locomotive Works, Inc.*, Lima, Ohio. Crane features include independent vacuum clutches for hoist, travel, swing and boom; helical cut gears throughout, elimination of keys by use of square lever shafts and large diameter, wide face drums.



Monitor Cab Diesel Cranes

FEATURING 100 per cent visibility in all directions, a patented Monitor type cab is now available on certain types of diesel locomotive cranes made by *Industrial Brownhoist Corp.*, Bay City, Mich. Elimination of blind spots found in usual cab construction is said to permit faster operations and to greatly reduce accident hazard. Cranes conform to standard clearance dimensions and have ample head room.

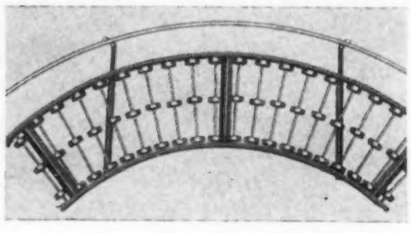


Drum Cradle

GREATER safety, ease of operation, substantial construction and low price are advantages noted for new model 45 drum cradle truck introduced by *Morse Mfg. Co., Inc.*, 304 West Jefferson Street, Syracuse, N. Y. Design gives a substantial wheelbase well under center of weight of drum, with two wheels mounted on a straight axle and two on easy turn coasters.

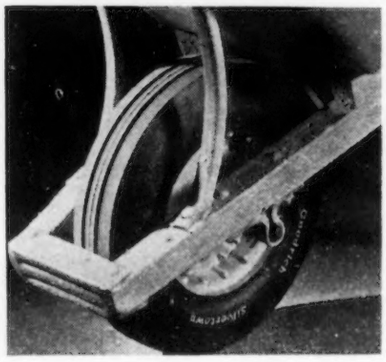
90 Deg. Conveyor Curve

METZGAR CO., Grand Rapids, Mich., has developed an 8-ft., 90 deg. curve for its line of wheel type conveyors for use where a wider sweep than that provided by company's standard 5 ft. curve is required. Construction of new curves includes oilless dust-proof wheels and arc welded channel members. Thumb screw adjustment for height is provided and curve rail can be quickly adjusted to width of cases.



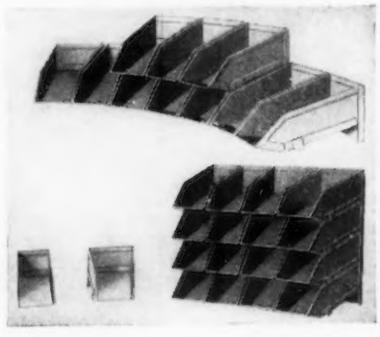
Rubber Wheelbarrow Tire

COMBINING advantages of both pneumatic and solid type tires, the new wheelbarrow tie marketed by *B. F. Goodrich Co.*, Akron, Ohio, requires no inflation. This tire is filled with highly resilient cushioning rubber, eliminating hazard of punctures or leaky valves. Load carrying capacity is equal to 4-ply pneumatic tire. Carrying capacities of 645 and 240 lb. are available.



Assembly Bins

STACKING assembly bins to hold larger parts are now available from *Stackbin Corp.*, 66 Troy Street, Providence, R. I. New bins are 12 in. long, 4 in. deep, 5 in. wide in front and 6 in. wide in back. As in the smaller models, contents are fed toward front of bin by a sloping floor. Bins can be set up in semi-circle and stacked one above the other. Openings are large enough to permit entrance of operator's hand.



The productive capacity of a milling machine depends more upon its rigidity than on any one other factor. Rigidity originates in the column — the backbone of the machine. Examine the column of a Milwaukee Milling Machine and you will see that it has been carefully engineered for the proper distribution of metal. An inside horizontal wall divides it into a double box section; the cross mounting of the motor permits a solid rear wall, which together with the solid front face, assures an unusually rigid structure.

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MILLING MACHINES

MILWAUKEE MILLING MACHINES

On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

• Automatic transmission under a number of different names but springing from two basic systems is offered on several 1941 cars . . . Production nearing 100,000 a week . . . Oldsmobile to make shells.

DETROIT — Very much like the battle over different kinds of coil spring suspension is the one already underway in the automobile industry over transmissions—particularly transmissions which are automatic in varying degrees, with embellishments.

It is easy to remember the days when there were only two schools of thought about how an automobile should be manipulated by the driver. In those days you either pushed the three pedals which Mr. Ford had installed on the Model T, or you aristocratically drove a "gear shift" car. Drivers faced graduation from the three-band planetary transmission of the Ford to the selective-shift gear box of other cars with dread that has in recent years seemed incomprehensible.

There is danger that the industry may again find itself with so many schools of thought on transmissions that the driver will be at the mercy of the engineer. Already the attendants of the parking lots and garages are having difficulty in starting and shifting gears because of the several variations in control systems which are offered on 1941 model cars. Purchasers of new cars are being confused also by conflicting claims about the newer transmission systems.

Only Two Basic Systems

DESPITE some half dozen or more names for the new transmission systems—the Vacuumatic, Powermatic, Hydra-Matic, Electromatic and Fluid Drive—there are only two new basic systems (although confusion follows this writer in some of the bypaths of the automotive transmission field, it must be confessed). The basic battle will be waged between the Olds-Cadillac combination, on the one hand, and Dodge-DeSoto-Chrysler on the other. Packard and Hudson may get into the fray a little later, but for the present it will be enough to try to differentiate between the two main contenders.

Taking a cue apparently from the "no stoop, no squat, no squint," of the radio people, the transmission builders started out last year to tell the driving public "start it, stop it and steer it" and this year offer "goodbye Mr. Clutch" and "let your left foot loaf."

Oldsmobile, now able to supply its Hydra-Matic transmission without difficulty on about 50 per cent of the cars it produces, has made no basic changes in the combination of liquid coupling and automatic transmission since last year when it was introduced. One minor change in the linkage on the starter switch has been made to kick the shift lever into neutral position for safety when the engine is being started.

This type of transmission has a shift lever on the steering column which can be moved on an arc to four positions indicated on the quadrant. These locations are marked for high, low, neutral and reverse. In this Oldsmobile system the clutch has been eliminated entirely as part of the driving problem. There is no clutch pedal. The normal method of driving is to move the lever to the "high" position and thereafter to use only the accelerator pedal and the brake pedal to control the speed of the car. Gear speeds are changed automatically through first, second, third and fourth gear ratios. The car can be stopped by merely depressing the brake pedal and holding it down. It is started again by stepping on the gas. This is available on the Cadillac also.

Chrysler retains the fluid drive offered last year, but makes it available now on the Dodge and DeSoto also. To complement the fluid drive, Chrysler has provided a new transmission that is semi-automatic in operation. This is called the Simplimatic. There are two automatic ranges, one covering first and second gear ratios, and the other covering third and fourth forward speeds. Between the two ranges the shift is made manually with a lever on the steering column that resembles the one which drivers have become accustomed to in the last two years.

It is necessary to use the clutch with the Simplimatic transmission for the manual shift but in the automatic ranges the shift is accomplished merely by removing the foot from the accelerator pedal for an instant. A vacuum controlled diaphragm, actuated by the pedal movement, operates the shift mechanism. Also a centrifugal governor operates an electric solenoid, which moves a latch in the diaphragm as a further control. The automatic shift from third to high takes place at speeds as low as 15 mph; the transmission automatically returns to third at 13 mph.

More Cars Have New Transmission

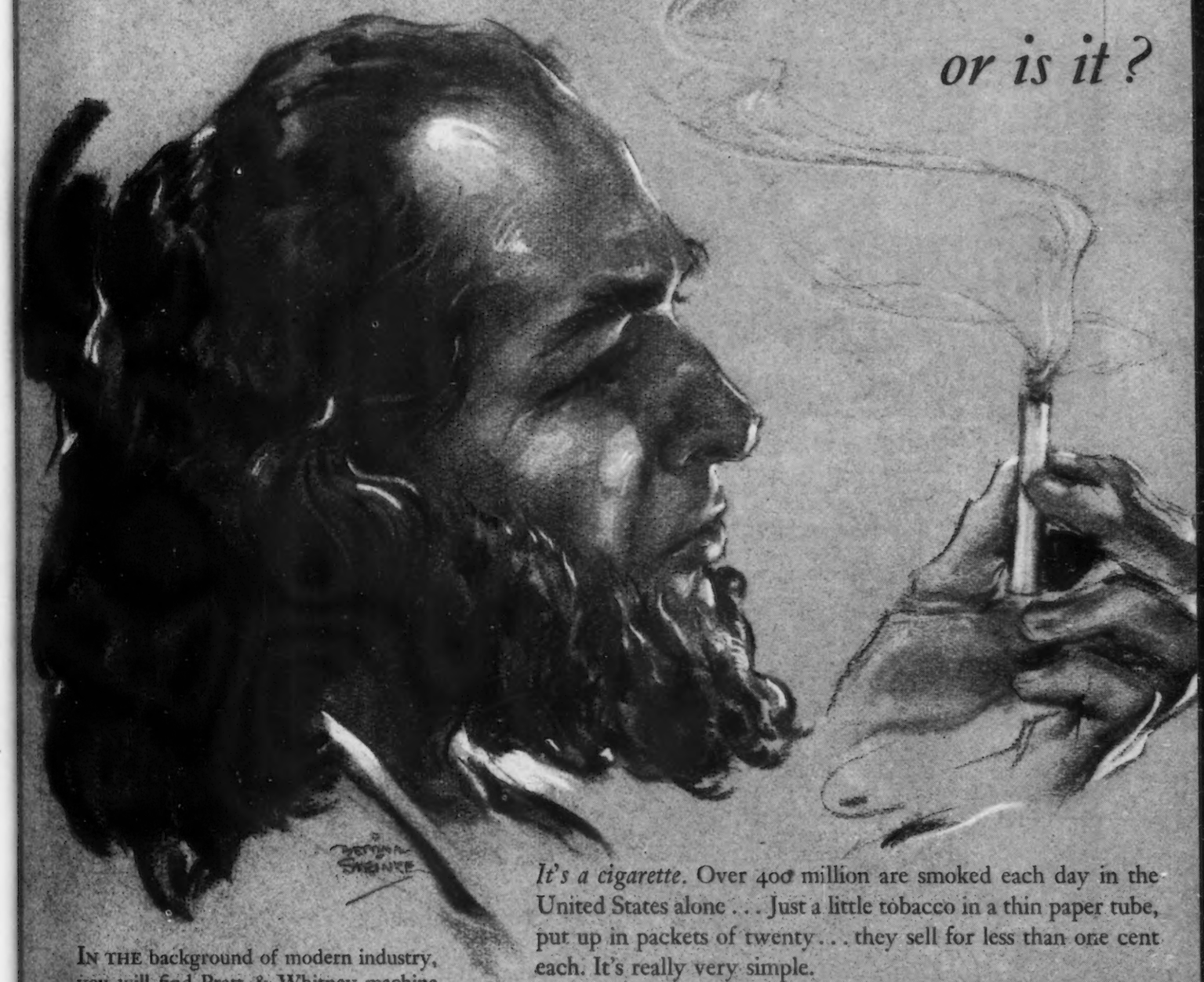
NO overdrive unit is used with such a transmission, the transmission itself being a form of overdrive. Incidentally, free-wheeling, which had practically passed out of the picture once, is provided in first and third gears, but not in second and fourth.

The vacuum booster control for the manual shift transmission with the lever on the steering wheel is provided on Chevrolet and Plymouth under the names Vacuumatic and Powermatic, respectively. Chevrolet, of course, offered this feature last year. This type of control is also available on the DeSoto and Dodge.

The Packard offering, it is anticipated, will be some

Simple, isn't it, Mr. Aristotle . . . .

or is it?



It's a cigarette. Over 400 million are smoked each day in the United States alone . . . Just a little tobacco in a thin paper tube, put up in packets of twenty . . . they sell for less than one cent each. It's really very simple.

No, of course slaves couldn't make them fast enough. Cigarettes are made and packed by *machinery* . . . Machines shred and blend the tobacco, make and print the paper, roll and trim the cigarettes, print and assemble the wrappers, pack, seal and stamp the packages, and put them in cartons . . .

What makes these machines? Other machines such as jig borers, lathes, drills, millers, die sinkers, shapers, grinders . . . yes, their work has to be accurate . . . measured in tenths of thousandths. You're quite right, sir, it couldn't be done by hand. We are so accustomed to seeing these everyday luxuries we forget that without their machine backgrounds they would be utterly impossible.

IN THE background of modern industry, you will find Pratt & Whitney machine tools, small tools and gages. Through accuracy, Pratt & Whitney keyword since 1860, production costs are lowered . . . new products are developed . . . new industries arise . . . new jobs are created. Pratt & Whitney accuracy makes rare luxuries common. Man moves to ever-improving comfort, economy, convenience, health, safety . . . across the background of Pratt & Whitney accuracy.

Accuracy

PRATT & WHITNEY

Division Niles-Bement-Pond Co. • West Hartford, Conn., U. S. A.

HEADS of General Motors—Highest ranking executives of GM photographed recently after an inspection of the 1941 line of Oldsmobile cars. Photo shows, at the wheel, Alfred P. Sloan, Jr., chairman of the board. Beside him is C. E. Wilson, acting president, and D. E. Ralston, who is general sales manager of Oldsmobile. In the back seat are three GM vice-presidents (left to right), Albert Bradley, R. H. Grant and C. L. McCuen. S. E. Skinner, new general manager of Olds, is standing beside the new model.

form of electric clutch operation, and Hudson is expected to offer an electric controlling device later. Packard already has an electrical control system with an electric governor which acts to cut in or out of overdrive at a speed of approximately 21 mph. Known last year as Econo-Drive overdrive, it has been rechristened Aero-Drive.

La Salle Cars Discontinued

The passing of another noted automobile name is marked as the 1941 models are readied for the Auto Show. La Salle, product of Cadillac, is not listed this year at all, the line having been dropped entirely. Simultaneously the huge Cadillac V-16 disappears from the scene. Replacing the La Salle, in effect, is a new 1941 Cadillac in the medium-priced field. Three new series of Cadillacs are offered, the series sixty-one, sixty-three and sixty-seven. The series sixty-two, sixty special and seventy-five are presented as a continuation and improvement of 1940 models. Each of the series is powered by a V-8 engine, boosted to 150 hp.

Fenders on the Cadillac are unique. Longer, and bullet-shaped, they carry the headlamps and recesses for a newly developed fog lamp. The die cast radiator grille has both vertical and horizontal bars, the vertical being somewhat subdued compared with the horizontal, but the overall effect being that of a checker board. The sixty special carries the fender one-third of the way back on the front door. This requires a two-piece fender, so designed that the rear telescopes into the front part of the fender as the doors open. Typifying a general trend, five times more chromium is used on this year's Cadillac cars than was used on 1940 models.

Announcement of Ford prices shows increases of $40 to $50 on various models, or a little more than 5 per cent, not counting the one-half of 1 per cent in taxes which became effective this summer. Dodge announcement of prices shows increases of $10 to $17 on the Detroit delivered prices. These Dodge figures, of course, include federal taxes and comparison is made by the Dodge sales organization with the prices in the immediate past, after federal taxes were increased. Increase on the Dodge is 1.1 to 2.1 per cent.

Oldsmobile's plans to operate a modern heavy press plant at Lansing have been changed to accommodate shell manufacture for the War Department instead. C. E. Wilson, acting president of General Motors, has announced that the heavy press plant, recently acquired and being equipped to handle Pontiac and Oldsmobile forging work, would be adapted to fulfill a shell order amounting to $9,505,600. Sherrod E. Skinner, general manager of Olds, will be the general manager of the armament operation. The plant has 150,000 sq. ft. of floor space. Preparation for the manufacture of shells has already been started but a considerable amount of new machinery and tools will be necessary before production actually begins. It is expected that first deliveries will be made in about eight months.

After months of planning and preliminaries, Packard got underway officially on its Rolls Royce airplane engine program with the announcement of a major administrative change and the initiation of machine tool buying. M. M. Gilman, president, has announced the elevation of J. H. Marks to the position of vice-president in charge of procurement, machinery and accessories. Marks has been purchasing manager of Packard since 1925. In addition to his other duties he will supervise the erection of new buildings and other details growing out of the expanding warplane engine contract. His experience dates back to the days of Packard's Liberty aircraft motor during the last war, when he was executive in charge of factory rearrangement and new construction. After the last war, he was in charge of manufacture of the Packard twin six.

Automobile production has been stepped up nearer the 100,000 mark and should pass that level this week. Output during the past week was 95,990 cars and trucks, compared with 78,820 in the previous week and 64,365 a year ago.

Where to look for INCREASED PLANT CAPACITY...

Here's a *new* place to find increased plant capacity in a hurry.

Check your dies and tools! Are they equal to today's demands—or are they "letting you down" by requiring frequent shutdowns for re-grinding or replacement? Tools that were "good enough" when the plant was idling along, may act as a drag on output today. Tool-caused shutdowns subtract valuable hours from productive time—cause *actual* output to fall far short of *rated* capacity of machines and presses.

How to overcome this condition with improved tool steels and time-saving methods is told in a new Carpenter booklet just issued. Send coupon below for your copy. It contains suggestions to quickly relieve production bottlenecks — and increase output.

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OUTPUT BOOSTED BY MATCHED TOOL STEELS

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"42 more productive hours per month per press."

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Without obligation, send me your new illustrated booklet that shows how to increase output per machine.

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Washington

BY L. W. MOFFETT
Washington Editor

• Roosevelt blames Congress, not business, for defense delay . . . But Wallace, his teammate, works other side of street, declaring industry in the U.S. wants to "appease" Hitler . . . Later the President again takes up attack

WASHINGTON — Recently at a press conference President Roosevelt vigorously came to the support of business. This unusual role was inspired by silly allegations that business was on a sit down strike and was not cooperating with the government on the national defense program. This time, instead of reverting to his familiar role of excoriation the President became a militant champion of business. Whatever slowness there is in the national defense program, he said, could be blamed on Congress, not business. He and business, the President said, were in agreement.

Mr. Roosevelt went on to say that business had a right to be hesitant about some contracts. It had a right, Mr. Roosevelt insisted, not to go ahead until it knew what the excess profits tax-amortization legislation was going to be. Warmly he denied that business was on a sit down strike.

While he was making this defense of business some of his closest buddies were pursuing an opposite course. His teammate, whom he jammed down the unwilling throat of the New Deal controlled convention at Chicago, shrieks up and down the land against business.

Appeasement Charge a Monstrosity

WALLACE, who has made a sorry spectacle of himself in his demagogic performance, throws any sort of charge that he imagines will catch votes. The fairness of accusations that business is for "appeasing" Hitler, that holding companies are monstrosities and so on doesn't concern him. Much higher grade campaigning had been expected of him. As it is, he has sunk to the low smearing level that is so common to such men as Ickes, Hopkins and others of their poor stripe.

In Congress, New Dealers, if they do not charge business with a sit down strike, rage against it for being not indifferent, but too eager, over the defense program by getting "fat contracts" and "inordinate profits." These oily politicians speak through *The Congressional Record* for home consumption. At the same time these political patrioteers exert all the pressure they can to get national defense plants with business men located in their districts, regardless of whether there is any justification whatever for the plants being so located.

In short the New Deal while urging national unity, has no hesitancy in playing politics up to the hilt with national defense. It pats business on the back where it thinks that is good strategy. It pounds it vigorously where it thinks that is also good strategy—and the latter is the most often used. As a prominent Washington correspondent once said, "The New Deal Administration moves mysteriously and simultaneously in all directions." Or, as the late Glenn Frank once said, "The New Deal plays by ear."

The President himself returned to his old form in his address at the University of Pennsylvania. Third Term Candidate Roosevelt affects to ignore the hard-hitting Willkie. But in reality Roosevelt has severely felt the jolts given him and by an oblique approach attempts to strike back. Willkie made a forthright presentation regarding the relationship of Government, business and private enterprise. He has pointed out that forces which stimulate private enterprises and jobs have been suppressed by policies of the New Deal which stop expansion and production, create vast idleness and cause great pools of frozen credits. Business has been kept in a state of jitters and fear, not knowing what additional regulation and regimentation will be forced upon it, what taxes will be laid only for punitive and not revenue purposes.

These things don't seem to bother the third term candidate. Though only a short time previously he had come to the defense of business, at the University of Pennsylvania he took a rabble rousing crack at it, clearly playing for the labor vote, again seeking to array class against class. Mr. Roosevelt said, for instance, that he cared more for the aggregate judgment of all workers than for the views of managers of American enterprise. Of course owners and managers represent capital investment in and technical knowledge of enterprises and obviously their judgment of business is better than that of the aggregate judgment of all the workers. That is no reflection on the workers. They simply haven't the interest or training and until they acquire the interest and the training their judgment is not as good as that of management. If Mr. Roosevelt really thinks what he said he amply proved Mr. Willkie's charge that Mr. Roosevelt does not understand the process of industry.

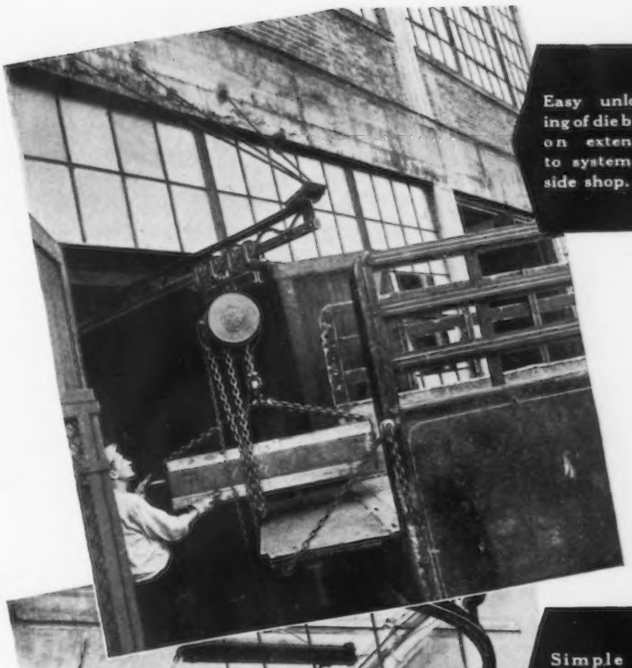
Ignoring the Many

THERE is irony in Mr. Roosevelt's professed faith for the judgment of the many. Never was such scant consideration given the judgment of the many—the political judgment—as has been shown by the New Deal. The centralization of power in Washington is proof of that fact. It is what makes many fear that the American republic is headed for the very thing the New Deal affects to hate so lustily—totalitarianism.

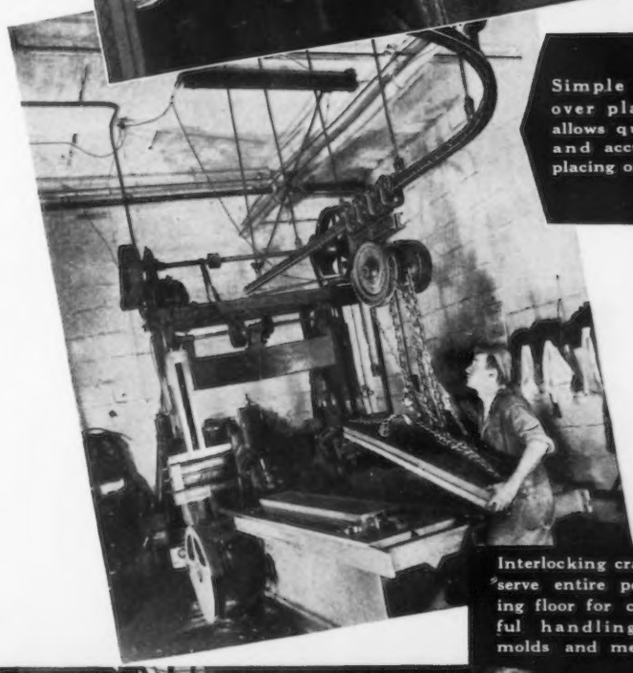
Simple Methods for stepping up Defense Production

With a surging demand for greater output, plants operating on defense materiel use every possible means to obtain it. It is no wonder that these plants are rapidly installing overhead handling equipment to relieve floor congestion...to gain time through process aids...or to conserve skilled manpower by eliminating handling fatigue.

Simple systems as shown here are quickly and inexpensively applied wherever a short cut is needed. American MonoRail engineers can spot these places in a short survey of your plant. They will then offer a detailed proposal which does not obligate you in any way. Why not give them a chance to help push along your defense production?



Easy unloading of die block on extension to system inside shop.



Simple spur over planer allows quick and accurate placing of die.

Interlocking cranes serve entire pouring floor for careful handling of molds and metal.

254 page catalog sent on letterhead request.

THE AMERICAN MONORAIL COMPANY

13103 Athens Ave. Cleveland, Ohio

No previous Administration has ever been delegated such tremendous peace time powers as those given Mr. Roosevelt.

Now Mr. Roosevelt is seeking perpetuation in office and if he succeeds fear is felt that some form of dictatorship and socialization will be inevitable and business will be only a robot for Government.

It may be said that with its billions for subsidies, handouts, and patronage, the New Deal affects confidence that it will stay in office. Rightly, perhaps, it places more reliance for success on the power of purchase than on any other element. This is sordid but realistic. Whether or not civilization is about to crack up, the world slip into bankruptcy and part of it into pestilence and starvation and other matters of tremendous concern appear to be of only secondary importance in the minds of millions of those who feed at the Federal Treasury.

In any case it is a big handicap to overcome though certainly every effort should be made to overcome it. Business definitely should arouse itself much more than it has so far to spare the country the calamity of a continued New Deal.

Bank Loans Ample for Defense Plant Expansion, Knudsen Says

Washington

• • • **William S. Knudsen,** head of the National Defense Advisory Commission's production division, received a report last week from the Federal Reserve System that manufacturers contemplating the expansion of facilities under the defense program currently have access to $3,000,000,000 in loans from established banking institutions.

On the basis of the report, the former General Motors executive expressed the opinion that after enactment of pending legislation manufacturers facing the necessity of plant expansion "should have no trouble in obtaining funds for construction promptly and at low rates of interest through their usual banking connections."

The banking survey, covering a cross-section of banks in each of the Federal Reserve districts, indicated that these institutions have available and are willing to loan an amount of money several times that which is believed required for expanding defense production capacity.

The pending legislation to which Mr. Knudsen referred is a bill passed last week by the House which for the first time would permit a manufacturer holding a government contract to assign the contract as security for funds needed for plant expansion. Because of this form of security, defense commission members expect that interest rates will be lower than on the usual type of commercial loans. In this connection, after consultation with the War and Navy Departments and the Comptroller General, the commission has developed a new form of contract under which borrowings from the banks are expected to be made by defense manufacturers.

The new contract has two purposes: (1) To expedite signing of supply contracts by the Army and the Navy by assuring the contractor against loss on construction undertaken for military purposes; (2) To safeguard the government's interest in such facilities on termination or completion of the contract. The plan provides that the government reimburse the contractor, not in addition to the unit price of the product purchased, as has been the case heretofore, but in five equal annual installments covering the amount of his capital expansion costs.

Hence, cost of supplies and amortization of construction cost by the government would be separated. It is felt that prices are thereby held at a minimum and, while the manufacturer is relieved of the risk involved in building fixed assets for the emergency, he still absorbs all the ordinary risks involved in production.

To state it a different way, adoption of the plan, officials feel, assures that neither the private manufacturer nor the government would assume in advance all the risk, nor subsequently reap as a profit the residual value. The contract contains provisions under which the contractor may, by purchase or lease from the government, acquire use of the facilities for himself after they have served

THE BULL OF THE WOODS — BY J. R. WILLIAMS

ANYTHING WRONG WITH MY HEALTH? NO SIR -- NOT A THING! NEVER BEEN SICK A DAY IN MY LIFE -- NEVER!
WELL, YOU WON'T DO, THEN -- NEXT!
YE GODS! WON'T HIRE A MAN BECAUSE HE'S TOO HEALTHY! WHAT'S THIS SHOP COMIN' TO?
PREPAREDNESS! THE ARMY GRABS OFF TH' HEALTHY ONES FER SOLDIERS, SO TH' BULL IS GRABBIN' OFF TH' SICKLY ONES FER MACHINISTS!
REPAIR ORDER
T. M. REG. U. S. PAT. OFF. COPR. 1940 BY NEA SERVICE, INC.
THE PREPARER
J.R. WILLIAMS
10-4

their purpose in connection with emergency defense needs.

Designed to conserve government funds and stimulate investment of private capital, the plan at the same time permits private manufacturers to manage and operate the business and assume all the ordinary risks. In short, government participation would be limited to actual expansion costs.

The legislation dovetailing with the new contract form was sponsored in the House by Chairman Hatton W. Sumners of the House Judiciary Committee. It was favorably acted upon by the committee after members of the defense commission and other government spokesmen advanced the plan as a likely method for substantially increasing the number of manufacturers able to contract with the government by permitting them to assign defense contracts as a basis for credit. Under present law claims against the government may not be assigned.

The measure as passed by the House has some limitations. The contract to be assigned, for example, must amount to at least $3,000, a figure which originally was fixed at $10,000 by the bill. Also, all defense contracts even though measuring up to the $3,000 limitation will not be assignable if in the opinion of the contracting agency the contract involves a military secret. In such circumstances the nature of the contract cannot be disclosed to any outsiders, including a banking institution.

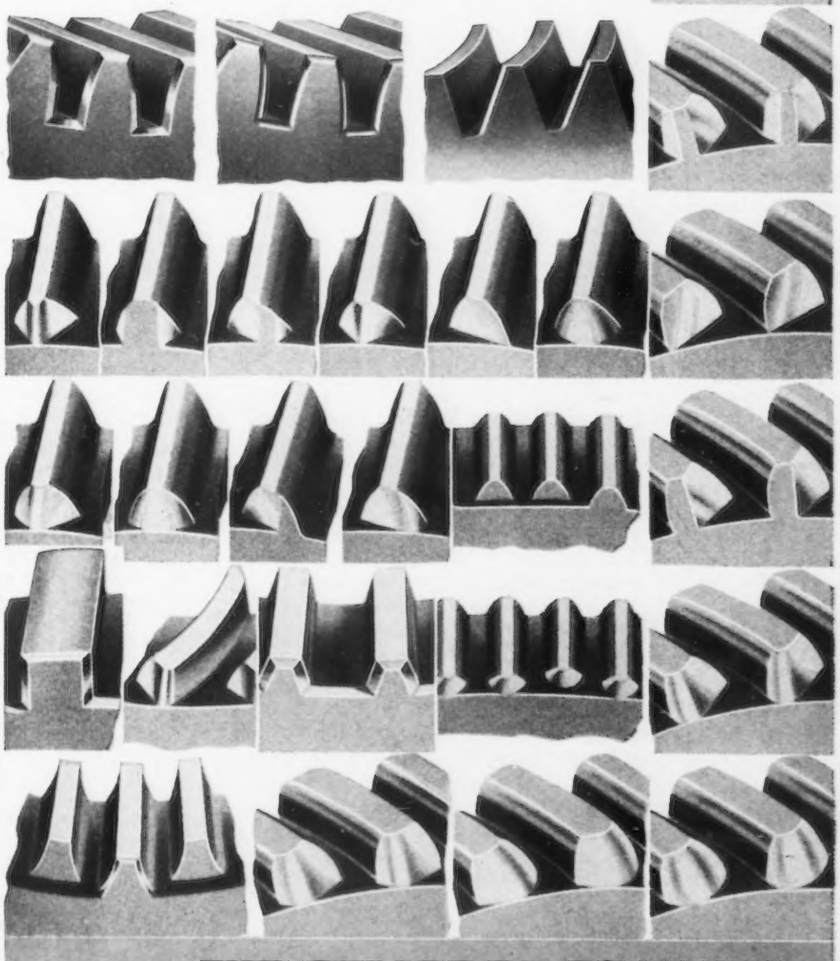
The latter limitation was accepted reluctantly by many members of the House who in voting for passage of the bill pointed out that while the benefits arising from the bill will be greatly restricted because of the provision, the exigencies of national defense show the necessity for forbidding assignment of certain contracts.

In conducting the banking survey, the Federal Reserve System did not request firm or binding commitments, but merely asked the banks to indicate the availability of funds at the present time and under present conditions, without reference to funds which might be obtained from correspondent banks or Federal Reserve Banks on advances or discounts. Returns from other banks not included in the initial survey are expected to add substantially to the total amount represented as being available for the expansion of defense industries.

Automatic BURRING AND CHAMFERING OF GEAR TEETH

The burring and chamfering of gear teeth is now a rapid automatic machining operation economical enough to be applied to practically all types of machinery gears.

Cimatool Burring and Chamfering Machines automatically process spur, helical, hypoid, spline, bevel, internal and external gears—either or both ends of the teeth. Included are models and sizes to fit any type of production problem. And practically any form of burr or chamfer on any number or grouping of teeth is readily available. Some of the more common forms are illustrated here. Write for more complete information.



Cimatool

THE CIMATOOL COMPANY

Dayton, Ohio, U.S.A.

DIEMAKERS • MACHINE TOOLS • TOOL MAKERS

Fatigue Cracks

BY A.H.DIX

Premature Birth

• • • Although the first frost has not yet nipped the nose of Commodore Vanderbilt whose statue is just across the street, someone has already thought up a slogan for next year. It is *"Watch Business Hum in* '41," authored by Albert L. Morse, a Cincinnati clothing manufacturer.

We think it would be much safer to introduce the slogan *after* 1941 is over, for you never can tell. Some years ago the *Chicago Tribune* got excited about *"Nineteen Something-or-Other Will Reward Fighters."* As we recall it, it did no such thing. Of course, *"Business Will be Blue in* 1932" would have worked out all right, and so would *"Orders Will Be Fine in* 1939," but that is hindsight. And judging from current financial statements, *"You Can Well be Haughty About Nineteen Faughty"* seems a safe bet.

But we aren't entirely satisfied with *"Watch Business Hum in* '41." It lacks swing and in big league poetry circles the rhyming of "um" and "un" is considered corny. Offhand, we offer:

Your order book assuredly will be
As fat as Galento in '41 *A.D.*

The only trouble with that is that it is prophetic, and therefore unsafe. So better change it to, *"Maybe Your Profits* '41 *Anno Domini Will be As Fat as a Pig Fed on Hominy."*

Stopper

• • • You'll Never Wish for a Third Hand—*The Cincinnati Milling Machine Co.—Cincinnati Grinders, Inc.*

Etymological Stutter

• • • A purist sends us a clipping from an English newspaper, reading:

> Pieces of metal found near the coast are believed to be from a shell which arrived with forward velocity from the direction of the sea.

He cites "forward velocity" as a horrible example of redundancy and says he would like to see an instance of backward velocity. We can tolerate it as an attempt to distinguish the shell from one dropped or fired from an airplane. Our favorite aversion is *"They're both alike."* And then the New York *World-Telegram* speaks of two liquids as being *"mixed together."* Which reminds us of the story of the boy who said to the candy storekeeper, *"I'll take a cent's worth of them and a cent's worth of those—and mix them." "Here you are, sonny,"* the storekeeper answered, *"You get one of each. Mix them yourself."*

Self Backpat

• • • The headline on the English newspaper item is "SHELL MYSTERY," which is known in the trade as a "catalogue head." It lacks a verb, movement and excitement and is typical of the lifeless headlines used in overseas newspapers. Along about the turn of the century American newspapers began to abandon the Sears-Roebuck type of head and started using action heads. They are, of course, much harder to write, but are so far superior it is a marvel that the practice hasn't jumped the ocean.

An expert headline writer is the Fourth Estate's noblest work. In a few words he tells you the story, and sells it to you by whetting your appetite. Of course, you have to take everything we say *cum grano salis*, considering our heavy bias toward your favorite family journal, but the headlines and the general news treatment in the "News of Industry" section, beginning two pages toward your right hand, are said to be the best in the business. We know you have noticed it, but we just thought we would remind you.

Punctuation Has Day in Court

• • • The Dr. Johnson anecdote "Moff" sent us recently ended up with:

"Who am I to bandy trivialities with my sovereign."

We didn't know whether or not a rhetorical question rates a question mark, but he left it out and so did we. We still don't know, but soon will, for in a New York City civil service examination the candidates were asked to punctuate this question: "May I help you with your problem of reorganization of the personnel."

A number added a question mark. The examiners marked it incorrect, and the candidates have taken it to court, claiming that a question mark is standard equipment for a question, like a Willkie button on a Westchester, Wilmette or Shaker Heights commuter. It is now in the lap of Justice Hofstadter.

Brinelled Vocabulary

• • • Carl Crow speaks of *immutable* and *inevitable* as "cast iron words." Continuing the metallic metaphor, we suggest *inexorable* as being high manganese and *perhaps* as pewter.

Memory Test

If you can spell correctly the plurals of two-thirds of the following, credit yourself with an excellent memory:

Chateau	*Taxi*
Echo	*Sheaf*
Alto	*Emphasis*
Embargo	*Veto*
Talisman	*Cannon*
Judge Advocate	*Axis*

Answers are at the foot of the page.

Eight Hours Without Nourishment

At the various Government navy yards and arsenals, with one 8-hour shift, usually a half hour or one hour was given for lunch in ordinary peacetimes.

Now that these plants are going three shifts of 8 hours each no time is allowed for lunch. Presumably no one eats any lunch during the 8 hours, but actually of course the time for lunch is taken with Uncle Sam paying for it.

Estimating a half hour actually sneaked in for lunch, the 8-hour shifts are really working only 7½ hours a day. All time over 40 hours is overtime paid at time and a half; as a result the employees are receiving overtime pay for the 2½ hours difference each week, plus another half hour on the sixth day or a total of 3 hours not earned.

Taking as a fair average base pay $1 an hour, the overtime pay amounts to $1.50 per hour, or $4.50 for the 3 hours overtime per employee. Assuming there are at least 50,000 employees, the total loss to the Government is about $1,500,000 a year.

The remedy, of course, is to take three 7½ hour shifts and give a half hour for lunch on the employee's own time. Where the operator can safely eat his lunch and work a machine at the same time, give him credit for an 8-hour day, but this does not apply to the great majority of per diem employees.

"John Royalist," Watertown, Mass.

It's a long time between cups of coffee.

Puzzles

• • • The plurals are *chateaux, echoes, altos, embargoes, talismans, judge advocates, taxis, sheaves, emphases, vetoes, cannon* and *axes.*

Last week's puzzle is done this way:

This tectonic trifle was sent in by Howard G. Taylor, Indianapolis:

> *Divide a given triangle into three equivalent areas by drawing lines parallel to the base.*

STUDEBAKER · · · CHEVROLET · · · NASH KELVINATOR · · · REMINGTON ARMS · · · BUICK · CHRYSLER · · STEARMAN · · SCINTILLA MAGNETO · · · AMERICAN BRASS · · · PRATT AND WHITNEY · · · WRIGHT AERONAUTICAL · · · ALLISON · · BELL · · · CURTISS AIRPLANE DIVISION · · · WESTERN ELECTRIC · · · ALLIS-CHALMERS · · INGERSOLL-RAND · · FORD · · · BENDIX · · CUMMINS ENGINES · · ELECTRO-MOTIVE · · AMERICAN BRASS · · · REPUBLIC AVIATION · · · R-S LEFOUNDRY · · DOUGLAS · · LOCKHEED · ·

CYCLONE WAS THE BIG NEWS OF THE '35 SHOW...

IT'S BIGGER NEWS TODAY!

1935

CHICAGO, 1935—A new kind of furnace made headline news at the 1935 Metal Show. It was the Lindberg Cyclone Tempering Furnace—so genuinely a product of experience that heat treaters acclaimed it immediately with orders and installations in every part of the country.

Pioneering an entirely new kind of heating—the Cyclone had been subjected to 12 months of probation in the Lindberg Steel Treating plant before announcement in February of 1935. Here, for the first time, was positive-pressure, two-mile-a-minute circulation, combined with armor plate construction, so that this Cyclone provided laboratory heating accuracy plus battleship ruggedness to stand up on the production line day in and day out—24 hours a day—without the slightest tendency toward faltering.

The news of the Cyclone traveled fast, and by Metal Show time in 1936 the Cyclone had skyrocketed to first place in the tempering furnace field. 1937, 1938, 1939 saw the Cyclone making bigger headlines, not only in this country, but in China, Japan, Australia, South Africa, Russia, England, France, and South America, as well.

1940

CLEVELAND, 1940—and *today* the Cyclone is bigger news than ever, because industry is in the midst of a vast Defense Program and Cyclones are in action in practically every major aircraft, automotive, farm implement, and ammunition plant in the nation. And every day more Cyclones go to work—in fact the demand for Cyclones is so great that the seventh plant expansion of the Lindberg Factory has just been completed—with floor space increased fifty per cent.

So, if you're not using the Cyclone in your plant, visit the Lindberg Booth at the Metal Show and see why this furnace has so consistently been in the headlines. Look it over from stem to stern. Just a glance at the massive top casting will show you why this brute of a furnace will take all the abuse you can possibly give it.

See how heat is generated in a separate chamber so that radiation from heating source to work is impossible—see the powerful Cyclone blower fan that delivers heat to the work at two miles a minute. See why Cyclone Tempering is still in the headlines after five years.

LINDBERG ENGINEERING CO. • 228 N. LAFLIN ST. • CHICAGO

LINDBERG MAKES NEWS

News of Industry . . .

Steel Imports by U. S. at 2089 Tons

• • • **Imports of iron and steel** products (scrap excepted) reached a new low in August when the trade totaled only 2089 gross tons compared with 3390 tons in July and with 24,599 tons in August, 1939. The character of the August trade was such, however, that the value increased to $516,187 from the July figure of $351,826, but remained far short of the $1,354,288 total of August, 1939.

In so small a trade the 882 tons of pig iron imported—662 tons from British India and 220 tons from Canada—was the outstanding item, with receipts of flat wire and steel strips—396 tons all from Sweden—relegated to second place in point of tonnage although accounting for nearly 70 per cent ($356,589) of the August trade by value. Ferromanganese—267 tons, all from Norway—was the other outstanding commodity imported during the month.

Leading markets in point of tonnage were British India, 662 tons; Sweden, 612 tons; and Canada, 433 tons—the Canadian figure including 105 tons of ferrosilicon. Scrap imports amounted to only 16 tons valued at $148.

IMPORTS

August, 1940
(Gross Tons)

Pig Iron—882	
Canada	220
India	662
Iron Ore—193,850	
United Kingdom	15
Canada	21,604
Mexico	431
Cuba	5,800
Brazil	11,500
Chile	154,400
Philippine Islands	100
Manganese Ore—35 per cent and over—107,647	
Battery grade	487
Gold Coast, West Africa	487
Other	107,110
Russia	40,356
Mexico	45
Cuba	3,975
Brazil	7,520
Chile	224
India	13,671
Netherland Indies	288
Philippine Islands	5,983
Union of South Africa	13,699
Gold Coast of West Africa	21,349

Photo by International

PICTURED above is a room in the Colt firearms plant at Hartford, Conn., where a line of .30 caliber machine guns, many for use in aircraft, are undergoing inspection before going to the finishing room. The Colt plant is making .30 and .50 caliber machine guns for the Army.

Ridge Tool Co. Moves Plant to Elyria, Ohio

Elyria, Ohio

• • • **Ridge Tool Co.** of nearby Ridgeville, Ohio, soon will move its plant to Elyria, according to Carl Ingwer, president. The company employs around 200 workers.

Machine Tools Near World War Peak

• • • **That the current annual rate** of machine tool production is near the peak attained during the World War is the belief expressed by David Longanecker, machinery specialist of the Bureau of Foreign & Domestic Commerce, writing in a recent issue of *Domestic Commerce Weekly.*

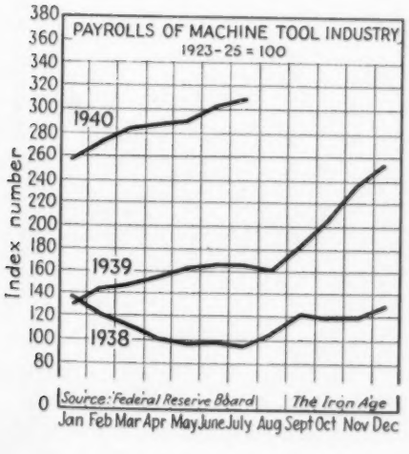
According to the indices of employment and payrolls in the machine tool industry, the outbreak of the European war in September, 1939, found operations in the industry just getting back to the 1937 levels, which were the best since the depression, and the industry expanded operations rapidly in an effort to meet demands. The index of employment rose from 140 in August, 1939, to 156 in September and in successive advances reached 193 in December. The corresponding payrolls indices were 160, 182 and 257. In July of this year (latest figures), the indices of employment and payrolls stood at 235 and 308, respectively. The trend in payrolls since January, 1938, is shown in the accompanying chart.

During the World War years, the tremendous demands on the American industrial system to meet both our own and Allied needs multiplied the demand for machine tools until operations in the machine tool industry reached an annual production rate estimated roughly at $500,000,000 toward the close of the war in 1918. This was 10 times the estimated output in 1914. Following the war, the industry underwent considerable contraction, along with other industries that found themselves overexpanded and overequipped for the normal peacetime demands for their products. As shown in Table I, the number of machine tool plants continued to decline even in the late "Twenties" and, obviously, the depression years had a marked influence on the

number of workers in the industry and on payrolls.

Improvement in the machine tool industry began to be aided in 1934 and 1935 by greatly increased foreign purchases, particularly by Great Britain, Russia, France, Canada and Japan. Exports in 1935 were more than three times the corresponding shipments of 1933. As Table II shows, foreign sales were even a greater factor in 1936. The British rearmament program was beginning to get under way. British purchases of American machine tools increased again in 1937 to a value of more than $14,000,000, Japanese purchases to almost $10,000,000, and Russia, Canada and France together accounted for a total of almost $14,000,000. The domestic market also showed appreciable improvement in 1937.

Foreign orders continued to be placed in increasing volume after 1937, whereas domestic purchases dropped in the business recession which set in toward the end of that year and remained at lower levels until the outbreak of the European war in September, 1939. The outbreak of the war resulted not only in a material increase in the already large volume of foreign orders being placed with the industry, but caused the release of a substantial amount of accumulated domestic purchases. Machine tool builders entered 1940 with a large backlog of both foreign and domestic orders. This backlog has increased despite continued expansion of the industry, augmented by a greater use of the practice of "farming out" or subcontracting for parts and assemblies. Developments in the European war and the initiation of our own defense program have added greatly to the already heavy demands on the industry.



Exports have been at even higher levels this year, as Table II and the breakdown in Table III show. Exports reached the highest level in April at a monthly value of $17,910,000. They have declined steadily since then, owing mainly to the discontinuance of purchases by France and the restrictions placed by the export licensing system.

Mr. Longanecker concludes his analysis with the statement that the most pressing problem of the machine tool industry at this time is the supply of skilled machinists. The problems of obtaining additional floor space and adding machine tools for its own use are capable of being solved in much shorter time, he believes, that it will take to find or train men.

Coming Events

Oct. 7 to 11—Twenty-ninth National Safety Congress and Exposition, Chicago.

Oct. 13 to 16—American Gear Manufacturers Association, semi-annual meeting, Skytop, Pa.

Oct. 14—Society of Automotive Engineers, annual dinner, New York.

Oct. 16—Porcelain Enamel Institute, fifth annual forum, Urbana, Ill.

Oct. 15 to 18—American Institute of Steel Construction, annual meeting, White Sulphur Springs, W. Va.

Oct. 17 to 19—American Society of Tool Engineers, semi-annual meeting, Cincinnati.

Oct. 21 and 22—Associated Machine Tool Dealers of America, annual convention, Dayton, Ohio.

Oct. 21 to 25—National Metal Congress, Cleveland.

Oct. 25 to 26—Foundry Equipment Manufacturers Association, annual meeting, Hot Springs, Va.

Oct. 31 to Nov. 2—Society of Automotive Engineers, national aircraft production meeting and exhibition, Los Angeles.

Australian Company Buys 6 Aluminum Rolling Mills

Pittsburgh

• • • **The Australian Aluminum Co. Ltd.,** Australia, has ordered six aluminum strip and sheet rolling mills from Lewis Foundry & Machine division of Blaw-Knox Co. It is understood the order includes mills for the rolling of cold aluminum strips as well as mills for hot rolling and cold rolling aluminum sheets. Although no specific information on the ultimate use of this equipment is available here, reports from Canada would indicate that the purchase is apparently part of the general British war preparedness program involving the construction of plants for aircraft, etc., at some distances from the British Isles.

Jones & Laughlin Pays $1 Preferred Dividend

Pittsburgh

• • • **The Board of Directors** of Jones & Laughlin Steel Corp. at its meeting last week passed the regular dividend on its cumulative 7 per cent preferred stock, but declared a dividend of 1 per cent —$1 a share—on account of arrearages on dividends on this stock to holders of record Oct. 8, payable Oct. 22.

Table I—UNITED STATES MACHINE-TOOL INDUSTRY

Years	Number of Establishments	Wage Earners	Wages ($1,000)	Value of Products ($1,000)
1914 ..	310 (1)	30,082 (1)	(2)	$50,000 (1)
1918 ..	378 (1)	77,194 (1)	(2)	500,000 (3)
1919 ..	403	53,111	66,179	212,400
1921 ..	348	21,307	25,252	67,729
1925 ..	329	30,831	46,711	144,202
1929 ..	280	47,391	76,410	244,578
1933 ..	232	12,714	12,596	41,433
1935 ..	259	28,185	37,261	121,833
1937 ..	292	47,266	78,284	260,243

Bureau of the Census figures unless otherwise noted.
(1) Estimates of War Industries Board.
(2) Figures not available.
(3) Estimate of War Industries Board of "annual rate of production" toward end of war.

Table II—Exports of Machine Tools by Principal Countries
(Thousands omitted)

	1938	1939	1940 (7 Mos.)
Great Britain...	$10,380	$25,570	$38,469
France	5,047	17,104	28,367
Japan	19,413	19,812	12,052
Russia	26,162	15,514	10,015

Table III—Value of Exports of Machine Tools, All Countries

1935....	$21,710,000	1938....	$74,670,000
1936....	32,270,000	1939....	93,404,000
1937....	47,600,000	1940*...	99,670,000

*Through July only.

Spain, Unable to Fill Its Own Needs To Ship Steel in Deal with Argentine

Lisbon, Portugal

A group of Spanish companies has concluded a barter arrangement with the Argentine by which Spain will ship steel products, mainly ingots, steel bars and joists and some sheets, in exchange for 150,000 tons of maize, wheat and fodder. Spain will supply these iron and steel products in October. This contract will be supplemented by another in which Spanish cement and 11,000 tons of steel rails will be bartered for Argentine products.

Spanish pig iron production in the north (Vizcaya) was only 37,168 tons in May and 36,476 tons in June, while steel ingot production was 39,465 tons in May and 40,214 tons in June. Production of both pig iron and steel is inadequate for the domestic demand. In August contracts were given to Germany for about 21,300 tons of steel products, mainly plates, hoops and sheets, but also alloy steels for the Eibar and other north Spanish industry.

(*Editor's Note: In view of the low steel production in Spain, it is possible to infer from this dispatch that some of the steel which Spain proposes to ship to the Argentine will be furnished by Germany, though there is no substantiation of this in our correspondent's report. However, it may be that the contemplated shipments from Spain bear some relation to the offers made a few months ago by German commercial agents in the Argentine and other South American countries of German steel shipments by October*).

Norway, which has only a small iron industry, has appointed a special committee to study the question of establishing near Oslo an iron and steel plant of 250,000 tons annual capacity. The government will participate with one-third. The production of electric pig iron was 23,000 tons in 1939 and will be doubled by installation of five more furnaces supplied by Germany.

A German vanadium cartel has been established, in which also the I. G. Farben is participating. Germany is exploiting the Norwegian vanadium mines by this cartel. The German wolfram cartel has refused to pay the advanced prices asked by Portuguese suppliers and reports that supply of wolfram from Spain, Norway, Russia and Rumania is satisfactory.

The only advances of steel prices in Germany this year are for all wire products, including netting. The domestic prices (which for about 15 countries are also the export prices) have been advanced by 4 to 8 per cent.

A new iron and steel cartel has been established in Belgium. Instead of the Cosibel, the Syndicat Belge de L'Acier (Sybelac) has been established, which includes all Belgian iron and steel works in close cooperation with the German iron and steel cartel. All export business goes through the new cartel and is being distributed by a new proportion between Germany and Belgium. The Luxembourgian steel works are outside and are entering the German cartel.

The Hungarian iron and steel industry reports that last year's production was a new record, but that this year's output will even be bigger.

Sweden feels itself to be cut off from the British market, as usually up to 30 per cent of the steel production and 12 per cent of the iron ore output went to Great Britain. The demand is very quiet, production at about 68 per cent of capacity.

Russia, which concluded a treaty of commerce with Sweden has, however, placed very important orders for machinery, which hitherto had been bought in the United States. Russia is also buying Swedish steel now.

BELOW IS a view of one of the assembly floors of an aircraft factory in Munich, where "Storch" planes are turned out at the rate of 50 a day, according to the German caption. The "Storch" is described as the "liaison plane of the German air force, used in maintaining contact with advance forces."

Photo by International

Photo by International

BRITAIN'S APPEAL for aluminum for use in Spitfire and Hurricane fighting planes and bombers brought out thousands of tons of aluminum pots and pans and other utensils from British kitchens. At the left, workmen are cleaning aluminum scrap, removing non-aluminum parts. At the right are aluminum ingots on the way to the airplane factories. Salvaging of scrap metal has been an important part of Britain's defense program.

The organization of the German trade with the Far East has been completed and the amount is constantly rising. After considerable difficulties in the beginning, when one train load per week was convoyed numerous trains are now running. The German (and other products) are sent to Königsberg by rail or water and by a joint Lithuanian - Lettonian - Russian-Chin-Se (Manchukoian) Japanese tariff, any kind of goods can be sent from any German station directly to Japan, Manchuria or China through established shipping agents. The time to reach Japan by Siberia was at first eight weeks, but is now only three to five weeks. Of course, this way costs more than shipping by steamer, but an increasing amount of traffic is done. Machinery, dyestuffs, medicines, alloy steels, chemicals, textiles, photographic products, etc., are sent to the Far East in exchange for Far Eastern products.

Argentina Plans Blast Furnace, Rolling Mill

• • • **Plans to construct** a blast furnace with an annual capacity of 100,000 tons, using the Itabira (Brazilian) iron ores and imported coke, are being considered in Argentina, according to a report prepared by the U. S. Bureau of Mines. In addition to the blast furnace, it is proposed to erect a Siemens-Martin furnace and a rolling mill with an annual capacity of 200,000 tons.

Despite the long haul necessary to bring the ore and coke to such a plant, the Mines and Geology Department of Argentina, which made the proposal for erecting the plant, believes that the cost of steel from such a mill would not be materially higher than costs in large mills in other countries.

If such a steel plant should be erected it is implied that intensive efforts will be required to collect domestic scrap if importation of this raw material is to be avoided.

The only steel mill in Argentina at present is located at Haedo, Buenos Aires, near the seaboard. This plant, subsidized and controlled by the Government, consists of two 20-ton open hearths with an annual capacity of 25,000 tons. The plant rolls rounds and small shapes and also has a foundry and a sheet metal shop.

So far as iron and steel products are concerned, Argentina, previous to the war, purchased very little material from the United States. United Kingdom, France, Belgium-Luxemburg and Germany accounted for the bulk of Argentina imports in 1938.

Argentina at present does not produce any iron ore in commercial quantities. Manganese ore output is slowly expanding but 1939 output was only 651 metric tons. Tungsten ore production in that year was 1150 metric tons. Lead and zinc ores and silver metal are Argentina's chief metal resources.

Armco Competition For S. A. Students

• • • Engineering students from technical schools in South and Central America are participating in a contest sponsored by the Armco International Corp., Middletown, Ohio, to encourage closer technical relations through development of a more standardized vocabulary of engineering terms in Spanish and English.

The E. A. Emerson engineering award for 1940 provides a prize of $100 for the student in each of the accredited schools who submits the best reports on Spanish terminology, metric tables and formulae used in a drainage handbook published by the company. Winner of a grand prize of $1,000 will be announced in January, 1941.

(Technical men have long been handicapped because technical terms mean different things in various S. A. countries. An example: several years ago an oversize building brick introduced in a S. A. country became known as a King Kong brick, named after the film. Because the letter "K" is hard to pronounce in Spanish, the word was changed to "quincones." This word meant nothing in other Spanish-language countries.)

Bomb Rack Maker Completes Expansion

Columbus

• • • **An expansion** program of the Kline Manufacturing Co., 505 West Rich Street, has been completed. W. L. Kline, president, said the one-story addition, which gives the company approximately 4000 sq. ft. of additional floor space, brings the total floor area to 12,000 sq. ft. The company manufactures aircraft accessories such as bomb racks and other items of armament equipment.

G-E Breaks Ground for New Pittsburgh Warehouse

• • • **Preliminary work** has been started on a new General Electric service shop and warehouse in the East Liberty District of Pittsburgh. The builders are Mellon-Stuart Co., Pittsburgh. The two-story structure will be of steel and brick and will have a 156-ft. frontage on Penn Avenue. It will be 153 ft. deep.

10% Increase Seen For Steel Loadings

• • • **The Allegheny Shippers Regional Advisory Board, meeting at Youngstown, Ohio, estimated that needs of the steel industry in the Pittsburgh-Youngstown - West Virginia Panhandle district in the last quarter of 1940 will be 250,000 cars, a 10 per cent increase over the like period of 1939. Coal and coke requirements of the district for the period were estimated at 621,234 cars, an increase of one per cent.**

Yearbook Gives Extensive Information on Scrap trade

• • • **Detailed information** relating to the iron and steel scrap industry is presented in the 1940 edition of the yearbook of the Institute of Scrap Iron and Steel. Statistics on production and domestic consumption of scrap, exports, stocks and prices are given in extensive tables. Developments in the export trade are also discussed at length and a section is devoted to the "bundle" industry, giving a list of all scrap dealers who operate baling presses.

Department of Commerce specifications, conversion data and a list of members are also included. Copies of the yearbook are available from the institute, 11 West 42nd Street, New York, at $1 a copy.

New Competition for Bridge Design Students

• • • **The American Institute** of Steel Construction has announced another annual bridge design competition, open to registered students of structural engineering and architecture in recognized technical schools of the United States, and offers three cash prizes of $200, $100 and $50, respectively, for the designs placed first, second and third. The subject of the competitive design is a steel overpass bridge to carry a single track railroad over a highway. A jury of engineers and architects will judge the competition on Feb. 19, 1941. Drawings must be received at the executive offices of the American Institute of Steel Construction, 101 Park Avenue, New York City, not later than Feb. 10, 1941.

Old Willys-Overland Units to Boice-Crane

Toledo

• • • **Four units of** the former Willys-Overland plant at Central Avenue and New York Central railroad have been acquired by the Boice-Crane Co., makers of wood and metal-working machinery. In the new 3-story plant of 50,000 sq. ft. floor space, the company will merge plants now at 1730 Norwood Avenue here and in Adrian, Mich. The company was started in 1929 by William B. and John E. Boice and while growing up with the hobby shop business in this country has also developed large foreign markets. It is also enlarging into the machine tool field as a result of armament production requirements.

Color, Sound Film Shows Making of Stainless Steel

Pittsburgh

• • • **A color and sound** motion picture, dealing with the manufacture of stainless steel from the melting furnace to the finished products, entitled "Steel For the Ages," has been completed by Allegheny Ludlum Steel Corp.

In addition to shots of tapping, teeming, cogging, rolling, and drawing stainless steel, the picture includes views of several different mills, such as sheet manufacturing at the Brackenridge plant, wire and bar manufacturing at Dunkirk, N. Y., and the cold strip mill at the Wallingford Steel Co., Wallingford, Conn. Interested groups are advised to contact Allegheny Ludlum Steel Corp., Oliver Building, Pittsburgh, for information about bookings.

$14,000,000 Loading Plant Contract Is Awarded

Washington

• • • **A $14,000,000** contract to Sanderson & Porter, New York, for an ammunition loading plant in Illinois, a $1,649,000 contract to Pacific Bridge Co., San Francisco, for a floating dry dock at Mare Island, Cal., Navy Yard and a $360,000 contract to Scovill Mfg. Co., Watebury, Conn., for ammunition components were awarded on Monday by the War and Navy Departments.

Steel Production Off Steadily in Sweden

Washington

• • • **With Sweden's principal** steel markets being gradually shut off by blockades in Europe, her iron and steel production rate has been declining steadily since the February, 1940, peak, the American Commercial Attache in Stockholm reports. Demand for Swedish-made armaments is also reported to be slackening, and commercial iron sales are declining.

Some observers in Sweden look for resumption of sales to neighboring countries — Finland, Norway and Denmark—but a pronounced decline in the backlog of orders is feared before the end of the current year, the report said. Sweden's principal steel markets normally are Great Britain, the United States, Japan, Mexico and South Africa.

New Lathe Plant In Cincinnati Area

Cincinnati

• • • **The recently purchased** Norwood plant of Remington Rand, has been converted into a machine tool shop by the LeBlond Engineering Co., a newly formed corporation and a subsidiary of the R. K. LeBlond Machine Tool Co., Cincinnati. Output of a new rapid production lathe has been begun at the plant. Officers of the new corporation are R. K. LeBlond, chairman; Harold LeBlond, president; Walter DeWitt, vice-president; Frank Stuger, secretary and Edward Schultze, treasurer.

Iron Fireman Plant Concentrates on Defense

Cleveland

• • • **The Iron Fireman Mfg.** Co. has announced all stoker manufacturing operations of its Portland, Ore., plant will be transferred to the Cleveland plant to clear the way for defense work at the West Coast plant. The entire Portland plant will be converted to machining parts for 512 four-engined bombers being built by Boeing Aircraft Corp. of Seattle.

Navy Won't Use "Draft Industry" Provision

Washington

• • • The Navy Department has given assurances to industry that, in carrying out the voluntary preference procurement system adopted by the National Defense Advisory Commission, it has no intention of invoking the "draft industry" provision of the Selective Service Act signed by President Roosevelt, Sept. 16.

Follansbee to Make Forgings at Toronto

Pittsburgh

• • • **Follansbee Steel Corp,** announced that it is adapting the excess capacity of its Toronto, Ohio, plant for the production of carbon steel and alloy steel forgings. In making the announcement, John Follansbee, board chairman, said: "Recent changes in the company's production facilities make available at our Toronto plant excess open hearth capacity of 100,000 tons annually and forging equipment sufficient to handle this ingot tonnage. This move is prompted by special demand for this type of material associated with national defense requirements."

Arming Could Make Jobs for 4,400,000

Rockford, Ill.

• • • **Frances Perkins,** secretary of labor, at a recent meeting of the Illinois State Federation of Labor, said that the defense program would create 413,000 man-years of work at the site of construction projects, 1,732,000 in factories of final fabrication and 2,258,000 in the production and transportation of raw materials and semi-manufactured products. To these figures, she said, will be added large increases in employment in consumer goods industries.

A labor department survey, Miss Perkins declared, showed that the defense program will create directly enough work to keep 4,400,000 men busy for a year, half that number busy for two years or one-third for three years.

New Union Agreement For Electric Auto-Lite

Toledo

• • • **A new contract** governing working relations of 4000 employees of Electric Auto-Lite Co. has been signed by representatives of the company and the United Automobile Workers, C.I.O., Local 12. The plan includes some wage adjustments amounting to more than $250,000 in aggregate, a 25 per cent increase in vacation, adjustment of time permitted for bargaining committee members and a restatement of obligations of the union and individual members to the company. The vacation plan now in effect is in the form of a bonus due to the fact that employees in the industry usually get sufficient time off through seasonal production schedule adjustments. Second and third shifts were granted 5c. an hour increase in base wage under the new agreement.

$40,000,000 in Naval Contracts For Milwaukee

Milwaukee

• • • **The national defense** program will bring $40,000,000 worth of naval contracts to this area, according to Lieut. Henry A. Marshall, resident inspector, who has had to increase his material inspectors from one to sixteen and expects to assign six more soon. Work on which Marshall's staff is engaged does not include the $60,000,000 contract for ten submarines at the Manitowoc ship yards.

August Industrial Truck Bookings Valued at $492,615

• • • **Bookings of electric** industrial trucks in August totaled 122 units, second highest monthly total for 1940, according to Industrial Truck Statistical Association, 208 South LaSalle Street, Chicago. July bookings of 150 units were the highest for the current year. Net value of the August orders for chassis only, at factory, was $492,616.

August business included 100 cantilever trucks, three non-elevating platform trucks, six crane trucks, eight tractors and five special trucks.

Government Awards

• • • Contracts have been awarded by the Navy Bureau of Supplies and Accounts as follows:

Simplex Wire & Cable Co., Cambridge, Mass., cable, $18,666.
Pioneer Instrument Division of Bendix Aviation Corp., Bendix, N. J., gyro horizon, electric, $16,000.
Douglas Aircraft Co., Inc., Santa Monica, Cal., airplanes, $9,602,384.
Pioneer Instrument Division of Bendix Aviation Corp., Bendix, N. J., indicators, turn, and bank, $360,400.
Lloyd & Arms, Inc., Philadelphia, lathes, engine, $10,509.
General Electric Co., Schenectady, N. Y., tubes, power, electron, $13,519.
R. M. Hollingshead Corp., Camden, N. J., compound, rust, preventive, $31,883.
National Tube Co., Washington, D. C., flasks, steel, $177,230.
International Harvester Co., Inc., Washington, trucks, motor, $130,144.
Burke Electric Co., Erie, Pa., generators, motor, $14,007.
General Time Instruments Corp., Thomaston, Conn., clocks, mechanical, $24,345.
Yellow Truck & Coach Mfg. Co., General Motors, Pontiac, Mich., trucks, motor, $12,957.
General Cable Corp., Washington, D. C., cable, $23,952.
The Bullard Co., Bridgeport Conn, lathes, turret, $49,431.
Wm. Sellers & Co., Inc., Philadelphia, Pa., machines, boring, drilling and milling, $58,820.
All-Steel-Equipment Co., Inc., Aurora, Ill., lockers, metal, $81,467.
Swind Machinery Co., Philadelphia, Pa., machine, horizontal boring, milling and drilling, $17,565.
Bridgeport Brass Co., Bridgeport, Conn., tubes, condenser, $158,391.
The Electric Products Co., Cleveland, panels, welding outlet, $68,000.
Van Norman Machine Tool Co., Springfield, Mass., machine, milling, $6,604.
Crescent Truck Co., Lebanon, Pa., trucks, electric, $11,475.
Henry Prentiss & Co., Inc., New York, N. Y., machines, horizontal boring, milling and drilling, $51,924.
Associated Shipbuilders, Seattle, Wash., lighter, covered, $42,390.
Western Pipe & Steel Co. of Cal., San Francisco, lighters, covered, $462,000.
J. K. Welding Co., Inc., Long Island City, N. Y., lighters, covered, $167,500.
United Aircraft Corp., Hamilton Std. Propellers Div., East Hartford, Conn., propellers servicing equipment, $19,672.
Eclipse Aviation Div. of Bendix Aviation Corp., Bendix, N. J., starters, $201,762.
Bell Aircraft Corp., Buffalo N. Y., adapters, $19,750.

• • • The War Department has awarded the following orders for the Ordnance Department, Quartermaster Corps, or Chemical Warfare Service:

Harvey Metal Products Corp., Chicago, Ill., ammunition components, $145,800.
The Seiberling Rubber Co., Akron, Ohio, heavy duty tires, $11,369.
Pennsylvania Forge Corp., Tacony, Philadelphia, artillery material, $109,025.
Crucible Steel Co. of America, New York, annealed steel rods, $42,845.
Carpenter Steel Co., Reading, Pa., annealed steel rods, $42,845.
Bethlehem Steel Co., Bethlehem, Pa., annealed steel rods, $42,982.
Allegheny Ludlum Steel Corp., Watervliet, N. Y., annealed steel rods, $42,777.
Acme Machinery Co., Cleveland, Ohio, forging machines, $27,384.
Cincinnati Milling Machine & Grinders, Inc., Cincinnati, grinding machines, $16,157.
Vinco Corp., Detroit, gages, $75,096.
Revere Copper & Brass, Inc., Rome, N. Y., innertube nozzles, $57,426.
Crown Can Co., Philadelphia, chemical containers, $71,354.
Lloyd and Arms, Inc., Philadelphia, lathes, $14,670.
Landis Machine Co., Waynesboro, Pa., shell tapper, $16,857.
Continental Can Co., Inc., New York, canister parts, $29,301.
Union Iron Works, Erie, Pa., boilers, $78,831.
Federal Tin Co., Baltimore, Md., gas mask components, $42,308.

• • • The War Department has awarded the following contracts for airplanes:

Glenn L. Martin Co., Baltimore, Md., bombers and spare parts, $14,269,646.
Boeing Airplane Co., Stearman Aircraft Div., Wichita, Kan., training planes and spare parts, $6,934,096.
Boeing Aircraft Co., Seattle, Wash., bombers and spare parts, $59,762,850.
Lockheed Aircraft Corp., Burbank, Cal., pursuit planes and spare parts, $15,646,450.
Douglas Airplane Co., Santa Monica, Cal., transport airplanes and spare parts, $20,229,184.
Wright Aeronautical Corp., Paterson, N. J., airplane engines, $6,829,144.
Beech Aircraft Corp., Wichita, Kan., training planes and spare parts, $13,115,138.
Vultee Aircraft, Inc., Downey, Cal., airplanes, $29,494,633.

• • • The National Defense Advisory Commission has cleared these contracts for the Ordnance Department and the Army Engineers:

Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., infantry weapons, $2,796,056.
Pullman-Standard Car Mfg. Co., Hammond, Ind., infantry weapons, $838,150.
Miller Printing Machine Co., Pittsburgh, Pa., infantry weapons, $503,727.
Continental Motors Corp., Muskegon, Mich., automotive engines, $11,412,000.
Autocar Co., Ardmore, Pa., half track vehicles, $7,271,103.
Guiberson Diesel Engine Co., Chicago, Ill., automotive engines, $2,915,095.
B. F. Goodrich Co., Akron, Ohio, track for half track vehicles, $1,409,439.
Sperry Gyroscope Co., Brooklyn, N. Y., searchlights, $9,075,150.
General Electric Co., Schenectady, N. Y., searchlights, $7,777,500.
Flour City Ornamental Iron Co., Minneapolis, Minn., pontoon equipment, $1,169,610.
Leach Bros., Oshkosh, Wis., pontoon equipment, $681,500.

Washington

• • • **The Division of Public Contracts,** Department of Public Works, reported that in the week ended Sept. 21, 15 government agencies reported 579 contracts valued at $131,540,760, compared with 12 government agencies reporting 450 contracts valued at $45,582,212 in the preceding week. Orders over $15,000 for iron and steel products and non-ferrous metals and alloys follow:

Iron and Steel Products:

Southern Pipe & Casing Co., Azusa, Cal., steel pipe, $36,290.
The Edwards Mfg. Co., Cincinnati, Ohio, metal caskets, $44,160.
The Eastern Rolling Mill Co., Baltimore, steel, $14,442.
Republic Steel Corp, Cleveland, pig steel, $21,053.
Builders Iron Foundry, Providence, R. I., telescope mounts, $29,501.
The Atwater Mfg. Co., Plantsville, Conn., nose plugs, $24,526.
Doehler Die Casting Co., Pottstown, Pa., ogives, $71,518.
York Safe & Lock Co., York, Pa., cradle assembly, $66,945.
Universal Crusher Co., Cedar Rapids, Iowa, cradle assembly, $92,400.
Crane Co., Washington, steel pipe, $102,689.
Rochester Ropes, Inc., Jamaica, N. Y., wire rope, $27,692.

Crucible Steel Co. of America, New York City, bar steel, $65,950.
Richard S. Danforth, San Francisco, anchor, $40,824.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., bolts and nuts, $52,911.
Budd Wheel Co., Detroit, shells, $309,282.
Carnegie-Illinois Steel Co., Chicago; American Steel & Wire Co., Cleveland, steel, $62,382.
Philips & Davies, Inc., Kenton, Ohio, service gates, $18,500.
Parker Appliance Co., Cleveland, fittings, joint, $17,914.
Aero Supply Mfg. Co., Inc., Corry, Pa., stud, $18,228.
Wright Aeronautical Corp., Paterson, N. J., nuts, bolts, washers, $16,511.
Pollak Mfg. Co., Arlington, N. J., manifold assembly, $98,233.
American Chain & Cable Co., Inc., American Cable Div., Wilkes-Barre, Pa., cable, steel, $27,000.
Baldt Anchor, Chain & Forge Corp., Chester, Pa., steel anchors, $38,400.
American Cast Iron Pipe Co., Birmingham, Ala., cast-iron pipe, $28,850.
United States Pipe & Foundry Co., Philadelphia, cast-iron pipe, $86,430.
Inland Steel Co., Chicago, Ill., corrugated roofing, $92,-747.
United States Steel Export Co., Washington, deck supports, $370,402.
Crane Co., Washington, steel pipe, $45,115.
Murray Mfg. Corp., Brooklyn, N. Y., shells, $902,000.
Auto Specialties Mfg. Co., St. Joseph, Mich., shells, $1,653,750.
American Steel Foundries, Chicago, steel castings, $17,-040.
Allegheny Ludlum Steel Corp., Brackenridge, Pa., steel, $32,433.
The Aetna-Standard Engineering Co., Youngstown, gun carriages, $1,703,050.
The Commercial Shearing & Stamping Co., Youngstown, super-structures, $27,781.
William Scrimgeour, Washington, D. C., knives, utensils, $25,988.
Waterbury Buckle Co., Waterbury, Conn., buckles, $11,-625.
National Tube Co., Philadelphia, steel tubing, $29,167.
Pheoll Mfg. Co., Chicago, Ill., screws and nuts, $64,528.
Boyle Mfg. Co., Los Angeles, Cal., barrels, $31,120.
United States Steel Export Co., Washington, fabricated structural steel, $27,321.
National Forge & Ordnance Co., Irvine, Pa., forgings, $117,925.
Crucible Steel Co. of America, New York City, forgings, $102,885.
Pennsylvania Forge Corp., Philadelphia, forgings, $109,-025.
Vanadium Alloys Steel Co., Latrobe, Pa., tool steel, $18,-107.
Detroit-Michigan Stove Co., Detroit, army ranges, $117,-375.
A. L. Cahn & Sons, Inc., New York City, funnels, ladles, $15,180.
Manco Mfg. Co., Bradley, Ill., reel unit, $62,900.
Gary Steel Products Corp., Norfolk, Va., mooring buoys, $15,990.
National Machine Products Co., Detroit, nuts, $21,504.
Taylor-Wharton Iron & Steel Co., Easton, Pa., cylinders, gas, $21,167.
Baldt Anchor, Chain & Forge Corp., Chester, Pa., anchors, cast, $56,700.
American Steel & Wire Co., Baltimore; American Steel & Wire Co., Cleveland, steel, $45,313.
Wheeling Corrugating Co., Wheeling, W. Va., hoods, $23,486.
United States Pipe & Foundry Co., New York City, plumbing supplies, $96,273.
Crucible Steel Co. of America, New York City, steel, tool, $28,384.
Aluminum Co. of America, Washington, D. C., rivets, $48,521.
Bethlehem Steel Co., Bethlehem, Pa., wire rope, $35,169.
Carnegie-Illinois Steel Corp., Philadelphia, steel bars, $65,400.
Widin Metal Goods Co., Garwood, N. J., mast base, $235,-999.

Non-Ferrous Metals and Alloys:

Northwest Lead Co., Seattle, Wash., lead, $18,480.
Waltham Watch Co., Waltham, Mass., springs, $21,250.
Aluminum Co. of America, Washington; Aluminum Co. of America, New Kensington, Pa. tanks, $60,108.
Magna Mfg. Co., Inc., Haskell, N. J., magnesium, $27,750.
Chase Brass & Copper Co., Waterbury, Conn., brass rod, $19,447.
Revere Copper & Brass, Inc. (Baltimore Div.), Baltimore, Md., tubes, $16,772.
The New Jersey Zinc Sales Co., Inc., New York City, zinc, $15,700.
Revere Copper & Brass, Inc., New Bedford, Mass., sheet, copper and nickel, $21,834.
American Hollow Boring Co., Erie, Pa., copper cylinders, $133,311.
The International Nickel Co., Inc., New York City, copper nickel cylinders, $184,030.
The International Nickel Co., Inc., New York City, nickel-copper alloy, $16,558.
Mueller Brass Co., Port Huron, Mich., brass forgings, $49,750.
The American Brass Co., Waterbury, Conn., bullet cups, $85,880.
Aluminum Co. of America, Washington, aluminum alloy, $22,500.
The International Nickel Co., New York City, nickel-copper alloy, $16,558.
Fairmont Aluminum Co., Fairmont, W. Va., aluminum alloy, $2,100,000.
Aluminum Co. of America, Washington, aluminum alloy, $15,030.
Bohn Aluminum & Brass Corp., Detroit, Mich., bushing, $18,896.
Revere Copper & Brass, Inc., Rome Mfg. Co. Div., Rome, N. Y., nozzles, $57,426.
Whitehead Metal Products Co., Inc., Cambridge, Mass., nickel-copper alloy, $16,504.
Pollak Mfg. Co., Arlington, N. J., fuses, $349,760.
American Emblem Co., Inc., New Hartford, N. Y., badges, silver, $22,209.

Other Machinery:

International Harvester Co., Chicago, tractors, $18,185.
Woodward Governor Co., Rockford, Ill., governor, $25,-500.
Allis-Chalmers Mfg. Co., Milwaukee, turbine, $577,325.
Erie Foundry Co., Erie, Pa., forging hammer, $27,570.
Moore Special Tool Co., Bridgeport, Conn., jigs, fixtures, $10,801.
Kingsbury Machine Tool Corp., Keene, N. H., tapping machines, $28,665.
Kingsbury Machine Tool Corp., Keene, N. H., drilling machines, $35,485.
F. J. Stokes Machine Co., Philadelphia, pellet machine, $29,481.
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati, Ohio, grinding machines, $16,157.
The G. A. Gray Co., Cincinnati, Ohio, planer, $45,913.
Austin-Hastings Co., Inc., Cambridge, Mass., planer, $45,725.
Consolidated Machine Tool Co., Rochester, N. Y., lathes, $87,960.
Carey Machinery Supply Co., Baltimore, Md., lathes, $10,622.
General Machinery Corp., Hamilton, Ohio, lathes, $588,598.
Greenfield Tap & Die Corp., Greenfield, Mass., gages, $31,429.
Lidgerwood Mfg. Co., Elizabeth, N. J., steering gears, $846,756.
Salvage Process Corp., New York City, cleaning outfit, $26,400.
Ingersoll-Rand Co., Washington, D. C., compressors, air, 720,765.
Pomona Pump Co., Pomona, Calif., pumps, $40,976.
W. F. & John Barnes Co., Rockford, Ill., spindle heads, $30,365.
Greenfield Tap & Die Corp., Greenfield, Mass., inspection gages, $16,991.
St. Joe Machines, Inc., St. Joseph, Mich., tumblers, $16,905.

Roosevelt Bans Scrap to Japan

Washington

• • • **Construed as a move** against Japan for her aggressive action in Asia, the order of President Roosevelt last Thursday, embargoing exports of all grades of iron and steel scrap, except to Great Britain and the Western Hemisphere, effective Oct. 16, marks a drastic tightening of the export licensing system.

It was known that the Administration had been preparing to place all grades of scrap under the licensing system, thus extending the regulations of July 26 which applied only to No. 1 heavy melting steel. But the embargoing of all grades for export except to Britain and Western Hemisphere reflected a more drastic step than it is believed was contemplated until Japan moved into French Indo-China. The resentment in Japan and accompanying reports of threatened reprisals, however, had been anticipated.

The Presidential order does not mention the word "embargo." Nevertheless it clearly provides for an embargo, with the exceptions indicated, for in stating that the exportation of all grades of scrap will be placed under the licensing system, it was specifically provided that licenses will permit shipments only to the Western Hemisphere and Great Britain. Going further the order provides for the revocation, effective Oct. 15, of "all outstanding balances of licenses" which have been granted under the original regulations for the exportation of No. 1 heavy melting steel. Hence tonnages of this grade for which licenses have been granted must be shipped by that date or the licenses will be revoked. They would be renewed only for shipments to Great Britain and the Western Hemisphere.

The scrap embargo was looked upon in some quarters as being a strong blow at Japan's war machine and to be more far reaching in its effect than was the abrogation by the United States last year of its commercial treaty with Japan, the July 25 embargo on aviation gasoline or the "moral" embargo on exports of airplane engines to Japan.

The effect of the embargo upon Japan's steel industry is not likely to be immediately noticeable. Imports of scrap since 1937, together with material acquired from other sources, such as scrapping old ships, has been substantially in excess of consumption and modest stock piles of scrap have undoubtedly been built up in Japan. However, with Japanese steel output probably running between 500,000 and 600,000 tons a year, and lacking domestic scrap supplies of any importance (in 1939 Japan obtained over 90 per cent of her scrap imports from U. S.), the embargo will unquestionably in time severely handicap the Japanese steel industry.

It is believed that Japan may now attempt to increase pig iron production both at home and in Manchukuo, depending chiefly on its own low grade Manchurian iron ore, and possibly to a lesser extent on steel from Malaya and British dominions though whatever supplies there are from the latter sources, it is reported, may be shut off. Even though she has joined the Berlin-Rome axis it is doubted that this affiliation will afford relief for Japan. Italy is known to be extremely short of steel while Germany is reported to require all she can possibly produce. Supplies of Swedish and Norwegian iron ore for Japan were cut off sometime ago.

It is not believed that even if Japan were financially able and attempted to get new steel, either in ingot, semi-finished or finished form, she would succeed under present circumstances. The opinion prevails that the United States Government might check such a move by placing steel exports under the same embargo-licensing system as has been applied to

Scrap Exports to Principal Buyers (Per Cent of Total Exports)

	August	July	June	Aver. for 1939
United Kingdom	39	43	49	14
Japan	40	35	18	57
Canada	16	17	17	5
Italy	..	..	6	12
Others	5	5	10	12

Origin of August Scrap Exports (Per Cent by Areas)

To → / From ↓	United Kingdom	Japan	Canada	Total
E. Coast	76	40	12	52
Gulf	24	29	..	22
W. Coast	..	31	..	12
Gt. Lks.[1]	..	..	88	14
Total	100%	100%	100%	100%

[1] Includes Buffalo.

August Scrap Exports—Tons

From ↓ / To →	United Kingdom	Canada	Japan	Spain	August Total	July Total
Maine and New Hampshire	5,394	80	.....	.....	5,474	10,007
Massachusetts	10,426	5,430	13,017	5,836	34,709	13,963
Rhode Island	.....	.....	6,487	.....	6,487	5,457
Buffalo	.....	3,473	.....	.....	3,473	6,435
New York	21,919	.....	24,591	4,450	50,960	65,038
Philadelphia	7,779	.....	1,321	.....	9,100	9,615
Maryland	22,071	.....	.....	.....	22,071	.....
Virginia	31,025	.....	.....	.....	31,025	15,273
North Carolina	4,821	.....	.....	.....	4,821	10,197
Georgia	.....	.....	2,988	.....	2,988	12,756
Florida	.....	.....	6,549	3,134	3,134	17,530
Mobile	10,577	.....	200	.....	10,777	9,738
New Orleans	4,444	.....	14,851	.....	19,295	13,135
Sabine	.....	.....	1,897	.....	1,897	4,268
Galveston	18,148	.....	21,640	.....	39,788	45,377
Laredo	.....	.....	1,756	.....	1,756	2,159
Los Angeles	.....	.....	15,210	.....	15,210	5,192
San Francisco	.....	.....	7,376	.....	7,376	5,698
Oregon	.....	.....	11,796	.....	11,796	18,856
Washington	.....	36	7,750	.....	7,786	5,752
Duluth and Superior	.....	24,601	.....	.....	24,601	7,795
Michigan	.....	18,378	.....	.....	18,378	23,530
Chicago	.....	1,786	.....	.....	1,786	2,211
Total, Tons†	136,604	55,117	137,429	13,420	346,087*	326,546*
Total, Value†	$2,459,362	$737,691	$2,293,191	$206,759	$5,741,660*	$5,435,498*

Table covers only shipments by principal customs areas to the larger foreign buyers. †Covers all exports, including small tonnages from customs areas not shown in tabulation. *Covers all shipments to all countries from all customs areas.

scrap and raise the objection that the steel industry capacity must be conserved for domestic commercial and national defense requirements as well as for the needs of Great Britain and the Western Hemisphere. Already there are reports that the scrap order may be extended to include copper and possibly other supplies.

Japan's purchases of American scrap in 1940, however, have fallen greatly below those of 1939 and 1938. In the eight months ended August, 1940, exports of scrap to Japan amounted to 662,738 gross tons, compared with 1,286,031 tons and 870,777 tons respectively in the corresponding periods of 1939 and 1938.

The restriction of export licenses is not likely to have any pronounced effect upon domestic scrap prices, outside of possibly causing a sentimental sidewise movement for several weeks until the flow of scrap can be adjusted to the new conditions.

An important reason why a sharp reaction is not probable is that export shipment from centers competing with domestic mills, which would be most sensitive to a cessation of exports, has been largely to Great Britain and Canada and this competition will not be materially altered by stoppage of Japanese shipments.

New York has been the chief point of origin for shipments to Japan over recent months and the embargoing of such shipments should make approximately 25,000 tons a month which heretofore has gone to Japan available for shipment to eastern Pennsylvania and Pittsburgh. English shipments from New York have also been in the neighborhood of 25,000 tons in recent months. Shipments to Japan from Philadelphia have been negligible thus far this year.

Gulf ports have been the second most important source of Japanese exports. Because of excessive freight rates from these ports to domestic consuming centers, the stoppage of exports will not likely cause material to move inland from these points.

Third in importance in Japanese shipments is the West Coast, where, if any place, the cessation of exports may have a dampening effect upon prices. No change at Chicago can be expected from the embargo as exports from there are almost entirely to Canada and will probably continue unabated.

↓ ↓

• • • **Exports of iron** and steel scrap to Japan in August were 137,429 tons, or 40 per cent of all U. S. scrap exports. The rise in the rate of shipments to Japan, coupled with a slight decrease in British shipments, put Japan in first place again as the largest consumer of U. S. scrap. Exports to United Kingdom in August were 136,604 tons and to Canada, 55,117 tons. Spain received 13,420 tons.

The deterioration of Japanese-U.S. relations in recent months is reflected by the sharp rise in the rate of export shipments to Japan from 56,776 tons in June to 137,429 tons in the past month. However, the August total is still below the average monthly shipments of 1939, which is 168,000 tons.

Shipments from East Coast ports in August accounted for 52 per cent of all shipments, as compared with 43 per cent in July. A slight gain was also shown in rate of shipments from Gulf ports. About 76 per cent of shipments destined for United Kingdom originated at East Coast ports in August. Japan drew 40 per cent from East Coast ports.

Average value of shipments to England in August was $18 per ton, as compared with $16.69 on Japanese exports.

U. S. Will Buy $30,000,000 Of Tungsten from China

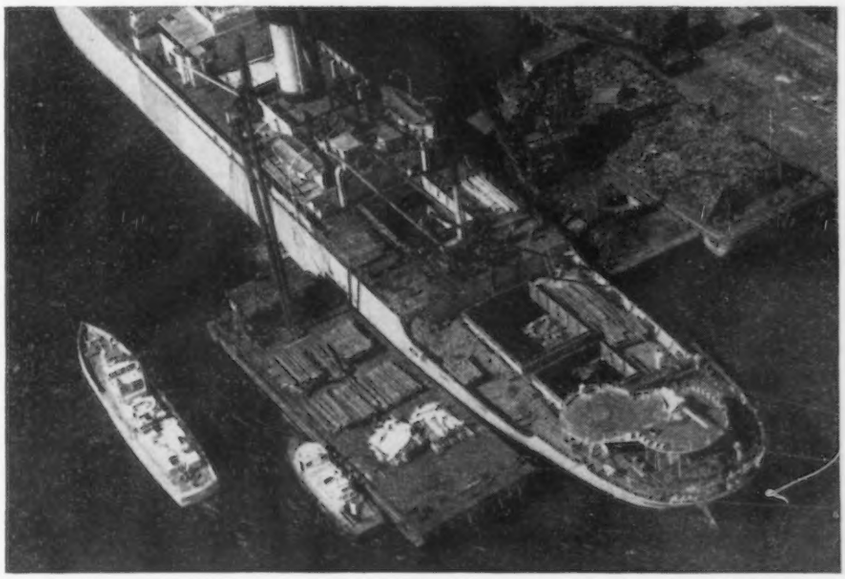
Washington

• • • **A decision to** purchase $30,000,000 worth of tungsten from China has been reached by the Metals Reserve Co., subsidiary of the Reconstruction Finance Corp. Delivery will be made over a period of years at varying prices.

Made public at a time when American-Japanese relations were becoming increasingly strained, the RFC announcement said that in order to assist China to meet her present foreign exchange needs the Export-Import Bank had arranged to lend China $25,000,000, an amount to be liquidated through the sale of tungsten.

As late as last March, the Export-Import Bank authorized a $20,000,000 loan to China which is to be repaid through the importation from China of tin. Some tin is already being shipped, according to Loan Administrator Jones.

SCRAP FOR BRITAIN—This airview shows an armed British merchantman at a Jersey City pier loading iron and steel scrap for shipment to England. Two other ships nearby likewise were loading scrap for Britain. Movement of scrap to the United Kingdom and countries in the Western Hemisphere was not affected by a Presidential order stopping shipment to Japan.



Loadings of Steel Seen Advancing 11%

Washington

• • • **Loadings of iron and** steel products in the fourth quarter are estimated at 549,113 cars by the Shippers Advisory Board of the Association of American Railroads. This would be an increase of 11.1 per cent over the 494,323 car loads of steel shipped in the final quarter of 1939. Coal and coke loadings are estimated at 2,107,093 cars, an increase of 3.9 per cent. Ore and concentrates are estimated to require 556,708 cars, an increase of 20.6 per cent.

The estimate for machinery and boilers is 34,411 cars, an increase of 19.9 per cent. Loadings for agricultural implements and vehicles are estimated at 17,931 cars, an increase of 14.4 per cent. Loadings of automobiles, trucks and parts are estimated at 212,672 cars, an increase of 22.1 per cent. Loadings of all of the 29 principal commodities included in the study are estimated at 6,511,835 cars, an increase of about 7 per cent.

National Cylinder Gas To Make Rego Products

• • • **Effective at once,** the National Cylinder Gas Co. will use the facilities of the Bastian-Blessing Co., Chicago, and engage in the production of a complete line of gas welding and cutting equipment under the Rego trade mark. The arrangement continues the activities of the Rego distributor organization, making Rego products available through such distributors and also through National district sales offices, according to Ellsworth L. Mills, vice-president of Bastian-Blessing.

"This is a timely National Cylinder Gas Co. step," said Mr. Mills, "whereby National's organization, with whom Compressed Industrial Gases, Inc., recently merged, will use the facilities of Bastian-Blessing and engage in the production of an even more complete line of welding and cutting equipment under the Rego trade name. The move, from our standpoint, widens distribution tremendously, making Rego available in complete stocks of equipment, repair and replacement parts through National district sales offices in principal cities.

Artist Businessmen Held As Spies in Youngstown

Youngstown

• • • **Steel mill scenes in** nearby Campbell, Ohio, lured four Akron businessmen who are amateur artists in their spare time. But citizens and police of the suburb mistook the painters for foreign spies and things were pretty serious for a while on Sunday, Sept. 22.

One man was found sitting on a fence beginning a sketch. Another was in an automobile and two more were on a railroad embankment. In their sport clothes they didn't look like businessmen, either. Police chief John Oshelski rushed the four to the local bastile and began grilling them.

Their eagerness for steel mill atmosphere gone after several hours' explaining, two of the artists painted harmless scenes in a community park.

Steel Capacity Ample For Time---Ryerson

• • • There is already evidence of hysteria about the war and rearmament demands upon the steel industry, Edward L. Ryerson, Inland Steel Co., chairman, said last week in Chicago at the annual meeting of the Association of Iron and Steel Engineers.

"I can see no reason, at the moment, for assuming that the demands will be greatly in excess of our capacity to produce during the next year or two," he said.

"Furthermore, I am convinced that unless conditions change radically there should be no great change in the costs and prices of steel products."

Universal Cyclops Installs New Furnace

• • • **The Universal** Cyclops Steel Corp., maker of carbon and alloy tool steels and stainless steels, recently purchased a 10-ton electric furnace from the Kelsey Hayes Wheel Co., Detroit. The furnace is being installed at the steel company's Bridgeville, Pa., works and it is understood that the capacity of this furnace will approximate 1500 tons a month.

NLRB Orders Armco Plan Disestablished

Washington

• • • **The National Labor** Relations Board last Thursday ordered American Rolling Mill Co., Zanesville, Ohio, to withdraw all recognition from and completely disestablish the Zanesville Armco Plan of Employee Representation as a collective bargaining agency for any of its employees. The board dismissed the remaining portions of the complaint which alleged that the company had participated in other unfair labor practices.

The board also: Dismissed a petition for investigation and certification of representatives filed by AFL's Lodge No. 402, International Association of Machinists, on behalf of employees of the tabulating machine service division of Remington Rand, Inc., New York.

Dismissed a petition for investigation and certification of employees of Precision Castings Co., Inc., Lakewood, Ohio, filed by CIO's National Association of Die Casting Workers.

B. & O. Metal Products Completing New Factory

Lena, Wis.

• • • **The B. & O. Metal** Products Co. is completing a concrete and steel factory and will shortly begin the manufacture of oil heaters and burners, based on a new principle for which patents have been applied. Five sizes of oil heaters are scheduled for production, including one for trailer use and a fireplace model. Contracts already have been signed that will keep the plant busy for several months. Arthur G. Mallien is president and general manager; Olaf Opitchka, secretary, and Bernard Bassett, treasurer.

Howard Acheson Controls Acheson Colloids Corp.

• • • **At the annual stockholders'** meeting of Acheson Colloids Corp., Sept. 13, it was revealed that sole control of the corporation has been acquired by Howard A. Acheson from Acheson Corp., New York.

Machine Tool Exports To Britain Gain 60%

Washington

• • • **Attributed to an** increase of nearly 60 per cent in shipments of machine tools to England, exports of industrial machinery rose to $38,466,083 in August from $31,093,954 in July, according to the Department of Commerce's Machinery Division.

Other groups showing gains in August were construction and conveying equipment, which rose 20 per cent; textile, sewing and shoe machinery, and "other industrial machinery," which increased 18 per cent and 8 per cent, respectively. Exports of power generating machinery declined 4 per cent and there was a drop of 13 per cent in foreign shipments of mining, well and pumping machinery.

Achieving the record total of $21,420,050, August exports of power-driven metal working machinery surpassed the previous high of $21,281,332 established last August, and showing a 44 per cent increase over July.

Exports of other equipment in August and July follow:

	August	July
Grinders	$4,504,421	$2,316,361
Lathes	3,807,855	2,377,133
Milling machines	2,864,179	1,903,285
Drilling machines	917,993	844,539
Rolling mill equipment	1,175,648	1,006,770
Construction and conveying equipment	2,821,332	2,352,152
Cranes, hoists and derricks	265,583	135,922
Excavators and parts	735,043	774,122
Textile, sewing and shoe machinery	1,780,163	1,512,858
Mining, well and pumping machinery	4,144,971	4,746,107
Power generating machinery	1,462,055	1,522,951
Diesel engines	222,562	183,375
"Other" industrial machinery	5,898,825	5,471,487

Steel Casting Design Described in Sound Film

• • • **A new sound slide** film explaining all the known and tested principles of steel casting design has been made available by the Steel Founders' Society of America. Organizations interested in showing film should address requests to the society, 920 Midland Bldg., Cleveland, or Northern Foundrymen's Institute, 304 Rialto Bldg., San Francisco.

New Edition of "Steel Making at Birmingham"

Birmingham

• • • **The 1940 edition of** "Steel Making at Birmingham," published by the Tennessee Coal, Iron & Railroad Co., has come off the press. The booklet, which outlines the various operations of the company, has had three former printings, the last in 1929.

Canada's August Iron Output 88,885 Tons

Toronto

• • • **Production of iron** and steel in Canada is holding at a record level. For August output of pig iron totaled 88,885 long tons, which was 7 per cent under the 95,924 tons of July but 38 per cent over the 65,920 tons reported for

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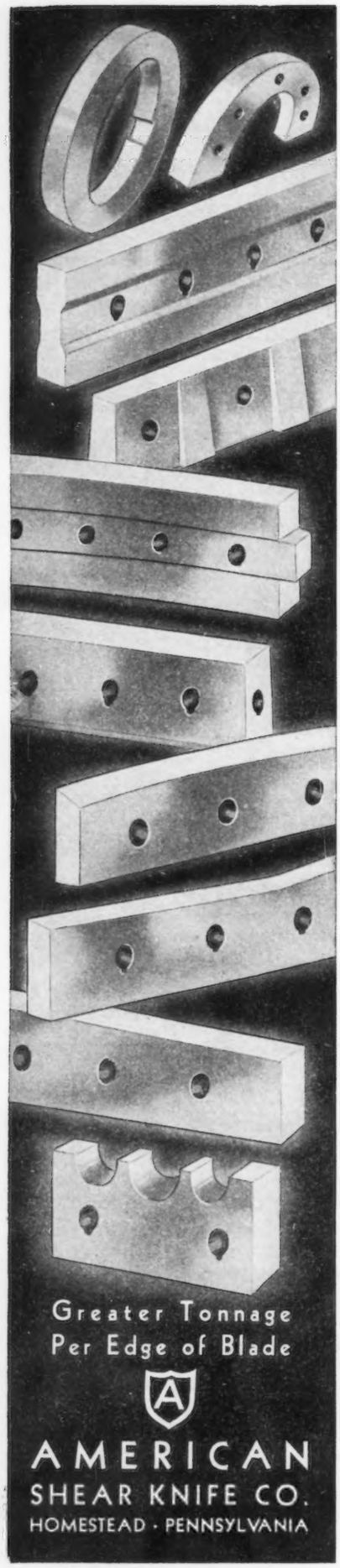


$100,000,000 Plane Orders for Martin Co.

• • • The War Department has announced the award of a contract totaling $99,641,880 to the Glenn L. Martin Co., Baltimore, Md., for airplanes. This contract was cleared by the Advisory Commission to the Council of National Defense.

August, 1939. Production for the month included 77,778 tons of basic iron down from 81,608 tons in July; 1754 tons of foundry iron against 8146 tons in July; 9353 tons of malleable compared with 6170 tons in the previous month. For the eight months ended with August production of pig iron totaled 734,436 long tons which compares with 422,028 tons for the corresponding period of 1939.

For the month nine blast furnaces were blowing out of 10 in Canada, having capacity rate of 93 per cent of total possible output. Furnaces were located as follows: Dominion Steel & Coal Corp., Sydney, N. S., three; Steel Co. of Canada, Ltd., Hamilton, Ont., two; Canadian Furnace Co., Port Colborne, Ont., one; Algoma Steel Corp., Sault Ste. Marie, Ont., three. The latter company has one furnace down, the only idle stack in Canada.

During August 9697 long tons of ferro alloys were produced against 9257 tons in July and 3313 tons in August, 1939. For the eight months ended with August production totaled 77,198 tons against 40,692 tons in the corresponding period last year.

Steel production in August at 172,210 long tons was the second highest monthly output on record being exceeded only in May, last, when output totaled 174,471 tons. August's rate compares with 169,577 tons in July and 122,019 tons in August, 1939. Cumulative production for the eight months ended August 31, totaled 1,300,033 long tons compared with 813,309 tons in the corresponding period of 1939. For the year to date production averaged better than 162,000 long tons per month which compares with monthly average of 139,000 tons in 1918, Canada's previous high record period.

Canada Ready to Place $20,000,000 of Orders

Toronto

• • • New business continues in heavy volume in the Canadian iron and steel markets as a direct result of the continued outflow of big contracts for war materials by the Canadian and British Governments. In addition to contracts valued at upwards of $8,000,000 placed during the past week, C. D. Howe, Minister of the Department of Munitions and Supply, stated that orders totaling upwards of $20,000,000 are ready for immediate awarding. Awards of more than $2,200,000 for construction undertakings are reported. Of the total, orders to the value of $953,641 were placed with United States companies and include $70,426 to American Chain & Cable Co., Inc., Braddock, Pa., for drydock supplies; $22,180 to Powell Anchor & Chain Co., Chester, Pa., for drydock supplies; $346,343 to Federal Laboratories, Inc., Pittsburgh, for munitions and $508,793 to U. S. Ordnance Engineers, Inc., Cleveland, for munitions.

C. D. Howe stated: "In 1941 Canada will be producing explosives at an annual rate of more than twice as great as the entire production of this country in the Great War. Our present chemicals and explosives program now involves capital expenditure of some $60,000,000 and includes the erection of 10 plants.

A factor of considerable importance to Canada's war industry is electric power and extensive programs are under consideration to augment the present supply. Plans have been announced regarding the construction of a new hydroelectric power plant at Carillon, Ont., on the Ottawa River to cost $20,000,000.

Back Wages for 369 Republic Workers Sought

Buffalo

• • • Payment of back wages to 369 employees of the Buffalo plant of Republic Steel Corp. and rehiring of 159 has been recommended by a National Labor Relations Board trial examiner in an intermediate report. Back pay would amount to about $150,000.

C-I Installs 2 More Electric Furnaces

• • • Carnegie - Illinois Steel Corp., it was learned this week, will increase its annual electric furnace capacity by approximately 100,000 net tons by the installation of two new Heroult electric furnaces at the company's South Chicago works. Installation of one 60-ton furnace rated at 15,000 kw. and one 30-ton furnace rated at 10,000 kw. is to begin immediately. The new project, which will be completed as soon as possible, is expected to be helpful in meeting the government's steel requirements for national defense.

It has also been learned that Sharon Steel Corp. has purchased a 15-ton electric furnace, the installation of which will begin soon at Sharon, Pa. This will be Sharon's first electric furnace.

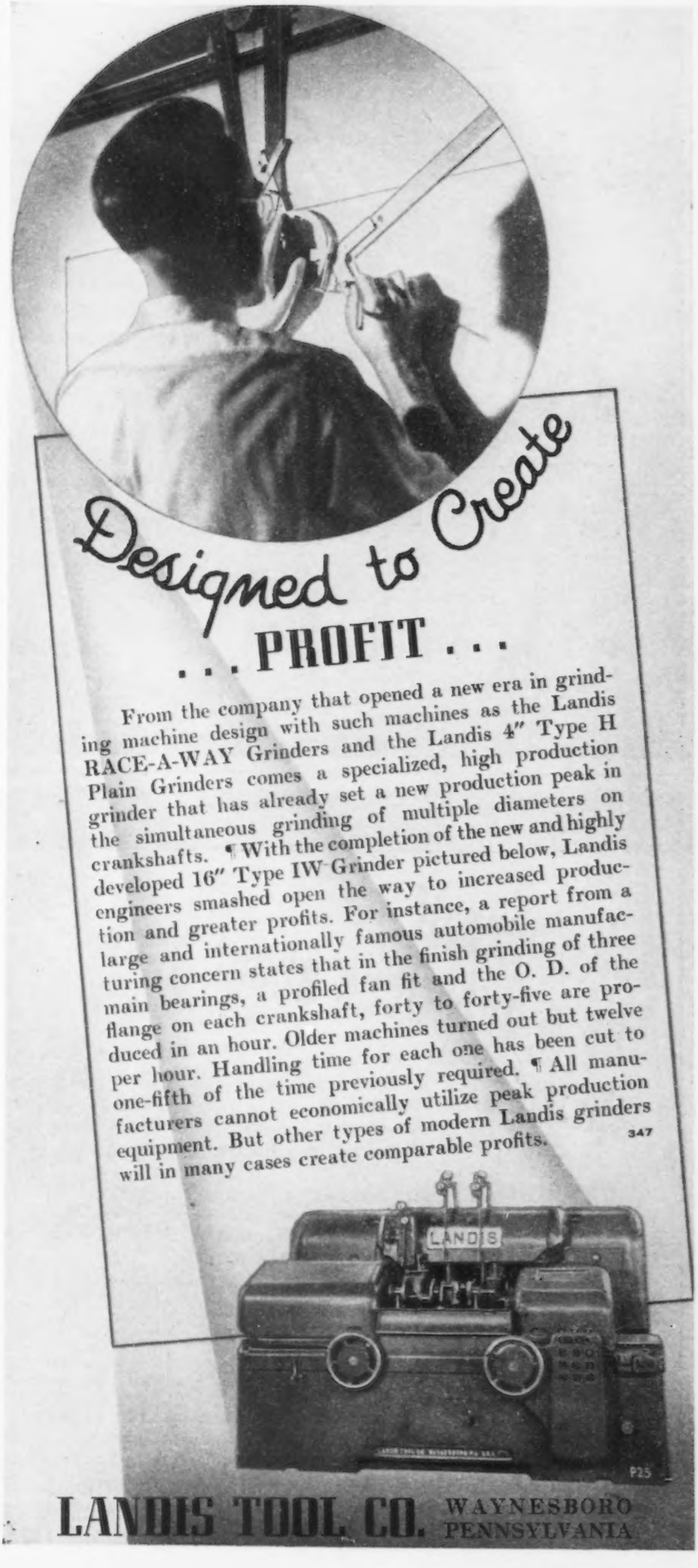
Warns Against Delay in Forming Price Agencies

Washington

• • • **The Brookings Institution,** reporting on wartime price control at the request of the War Department, said last week that a primary mistake in the conduct of the World War was the delay in establishing price control mechanisms and the failure to work out a coordinating price control machinery with authority extending to all aspects of the problem. The institution reported that World War experience demonstrated the wisdom of vesting price control in temporary agencies, to be liquidated on the return of peace, rather than in permanent Government departments.

L. J. Vieau Joins J. & L. New York Sales Office

LaMar J. Vieau has been appointed assistant district manager of sales, New York district office, Jones & Laughlin Steel Corp. He was formerly general manager of sales, McKeesport Tin Plate Corp., having been with that company since 1924. Previous to that time he was associated with Jones & Laughlin at its New York sales office.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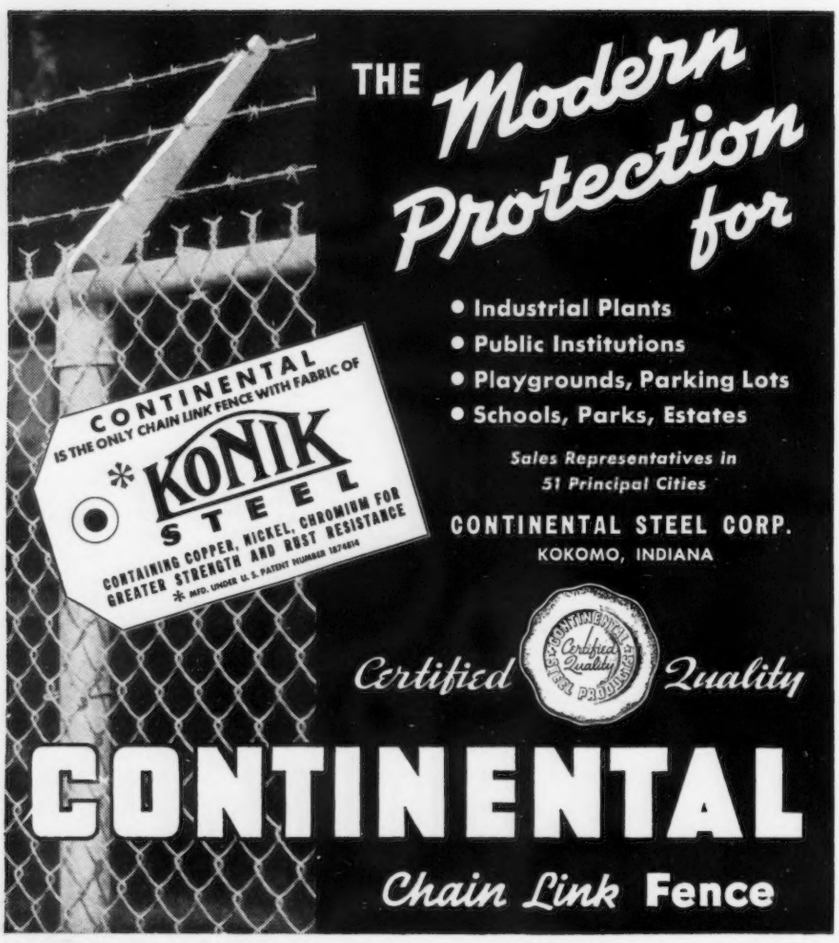
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Construction Begins on $14,000,000 Shell Plant

Ravenna, Ohio

• • • **Construction was started** Sept. 25 on the federal government's new $14,000,000 ammunition loading plant to be operated by the Atlas Powder Co. It will be located on a 20,000-acre tract west of the Trumbull-Portage County line. In addition to countless small structures devoted to shell loading, the project includes three administration buildings.

Bell to Build $1,000,000 Plane Assembly Plant

Buffalo

• • • **Construction** of a $1,000,000 plant at Niagara Falls, N. Y., for assembly of pursuit planes manufactured in Buffalo will be started soon by the Bell Aircraft Corp. The company has acquired a 58-acre tract adjacent to the Falls airport. The new plant will have an area of 240,000 sq. ft. and will employ 3000. A contract with the Austin Construction Co. of Cleveland calls for completion in 115 working days.

$200,000 Addition to Ohio Aircraft Plant

Alliance, Ohio

• • • **General contract** for construction of a $200,000 addition to the plant of the Taylorcraft Aviation Corp. here has been awarded to the F. H. Martin Construction Co. of Detroit. The structural steel contract was given to the International Steel Co. of Evansville, Ind., and the steel erection will be done by the S. E. Pentecost Construction Co., Detroit.

G-E to Spend $11,000,000 At Erie, Pa. and Lynn, Mass.

• • • **General Electric Co.** has adopted plans for an $11,500,000 plant extension program to include equipping the Erie, Pa., works with heavy machinery to build steam turbines for destroyers and light cruisers, and enlarging two Lynn, Mass., shops to make reduction gears for propulsion equipment. Such expansion will release Schenectady, N. Y., capacity for manufacture of larger turbines for battleships.

G-M to Build Plant for Machine Gun Order

• • • **General Motors Corp.'s Frigidaire division will build a 5-floor building at Dayton, Ohio, to fill a $20,000,000 order for machine guns for the U. S. government. Actual gun manufacturing is to begin in 10 to 12 months.**

$3,226,520 Contract For Submarine Base Project

Washington

• • • **The Navy Department** has awarded a $3,226,520 contract to the McLean Contracting Co., Philadelphia, for construction of a supply pier and the rehabilitation of existing piers and breakwater at the Norfolk, Va., submarine base. The award was made on a cost plus fixed fee basis. A $331,500 contract on a similar basis was awarded the Warren Bros. Roads Co., Cambridge, Mass., and the Buck-MacDonald Co., Boston, for improvements to naval air base facilities, Squantum, Mass.

Aerocoach Co. to Double Plant Area

Chicago

• • • **General American** Aerocoach Co., a division of the General American Transportation Corp., has announced a plant expansion program which will almost double the size of its present manufacturing area. Floor space will be increased from 55,000 to 100,000 sq. ft. and production capacity will be raised from one bus a day to seven buses in four days. The improvement program provides for the modernization of existing buildings, new tooling and other machines.

Continental Motors Plant May Reopen on Engine Order

Detroit

• • • **Reopening** of the former main plant of Continental Motors Corp. on E. Jefferson Avenue here, is expected to follow word that Continental has closed a contract with the British government "and others" for the manufacture of 5500 tank engines. The plant must be retooled before production can begin.

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G-E Meeting Shows Lighting Progresses Despite Obstacles

Cleveland

• • • **The last two to three years** have brought much progress in lighting, perhaps more than accomplished in a decade previously, 100 representatives of industrial magazines learned here Sept. 30 at a one-day lighting conference sponsored by the lamp department of General Electric Co. at Nela Park.

New horizons are unfolding constantly and the industry will continue its progress despite wartime conditions. Even in the short space of one year great strides have been made to adapt fluorescent lighting to industrial, commercial and residential purposes and to bring costs downward.

The editorial conference touched upon a wide range of subjects and inspected much of interest at Nela Park. C. W. Maedje and Dean M. Warren were chairmen of the morning and afternoon sessions, respectively. The guests were welcomed by M. L. Sloan, assistant general manager.

Dr. Zay Jeffries, speaking at the noon luncheon on "Business Perspectives," cited some of the problems and obligations of the lamp industry and General Electric Co., and stressed the necessity for balancing research and production.

Dr. Matthew Luckiesh, whose topic was "New Thresholds," told how the whole conception of light has changed in the past 10 years. The industry is now competing with daylight, whereas a few years ago it was competing with darkness, he asserted.

Summing up the day's program at a dinner in Shaker Heights Country Club, H. Freeman Barnes, head of the sales promotion department, touched upon the basicness of light, the wide ramifications of new products, the amazing growth of fluorescent light, and the importance of the amount and quality of light.

Office lighting was summarized by W. G. Darley, and industrial lighting by A. K. Gaetjens. New horizons in store lighting were summarized by W. M. Potter, who pointed out that average illumination in small stores has greatly increased.

Gary Employment At All-Time High

Gary, Ind.

• • • **An all-time high in industrial employment of 36,000 has been reached at Gary, Ind., due chiefly to the steel industry. Led by Carnegie-Illinois with a record employment of 20,500, all steel plants in this district report a new employment high. Weekly payrolls for this area are estimated at $1,300,000.**

2 BIG JOBS

WISCONSIN STEEL DOES BOTH

The modern steel plant has two important obligations to its customers. One is to make steel that meets the exacting demands of industry from day to day. The other is to explore the world of steel metallurgy and discover new and better steel-making methods that will be advantageous to industries using steel.

The plant where Wisconsin Steel products are made does both! While serving present needs through perfected control over manufacturing technique, our craftsmen keep their eyes on the steel frontier. They strive, through research, to make today's standard a thing of the past and to attain the ideal of tomorrow.

Wisconsin Steel is *at your service* in fulfilling *both* of these obligations. We invite you to write or phone us about your steel problems.

WISCONSIN STEEL COMPANY
General Offices:
180 North Michigan Avenue Chicago, Illinois
Affiliate of International Harvester Company

WISCONSIN STEEL

Steel Exports at All-Time High

• • • **Exports of iron** and steel (scrap excepted) from the United States, increasing for the fourth consecutive month, passed the million ton mark when, in August, shipments totaled 1,046,084 gross tons valued at $53,870,693, according to the Bureau of Foreign and Domestic Commerce. This is the largest total ever recorded for a single month's exports of these products.

July, 1940, exports, which had set a record, totaled 707,809 tons valued at $39,511,996, while the trade of August, 1939, amounted to only 185,182 tons valued at $13,282,599.

Addition of the August figures brings the cumulative export trade for the first eight months of 1940 up to a total of 4,524,507 tons valued at $291,352,901—more than three and one-half times as much in quantity and over three times as great in value as the comparable 1939 figures of 1,272,055 tons valued at $95,678,644.

Distribution of August iron and steel exports among principal markets and the takings of these markets in July and August, 1939, and over the first eight months of 1940 and 1939 is presented in the above table.

In point of tonnage the chief commodity exported in August was non-alloy ingots, blooms, etc., of which a total of 342,641 tons was shipped—287,319 tons to the United Kingdom, 27,473 tons to Canada, and 22,484 tons to Japan. Second largest was pig iron with the United Kingdom taking 119,139 tons of the 121,948-ton total.

The trade in "other" non-alloy plates aggregated 75,304 tons and included 41,602 tons sent to the United Kingdom, 12,451 tons shipped to Canada, and 7614 tons dispatched to the Union of South Africa. Exports of plain structural shapes soared to 74,330 tons on the basis of the 47,030 tons taken by the United Kingdom, and the 9768 tons sent to Canada, the 4846 tons shipped to Japan, and the 1834 tons which went to Venezuela.

Distribution of United States Exports of Iron and Steel Products
(In Gross Tons)

Principal Countries of Destination	August, 1940	July, 1940	August, 1939	January thru August 1940	1939
United Kingdom	653,866	376,066	11,783	1,655,042	52,750
Canada	108,017	69,969	34,701	501,674	166,241
Japan	66,829	17,025	4,235	192,537	89,941
Argentina	37,156	37,851	1,512	300,766	13,834
Union South Africa	22,859	20,092	3,371	107,083	30,136
Brazil	14,443	21,207	10,379	192,601	90,837
Philippine Islands	13,175	8,365	12,210	96,582	82,668
Total Exports, All Countries.	1,046,084	707,809	185,181	4,524,507	1,272,054

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Our automatic expanding and retracting tools for producing duplicate parts have many advantages over those of conventional design. The cam actuated types illustrated here attain extreme accuracy to and from cutting position. Their design and production for unusual purposes are our particular job. Try us!
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In Canada, Hi-Speed Tools Ltd., Galt, Ont.
SPECIALISTS IN FINE CUTTING TOOLS FOR 24 YEARS

Brazil's New Steel Plant, Costing $45,000,000, to be Fully Integrated

Washington

• • • **While government** officials say details have not been determined, it is reported that the Brazilian steel plant for which the Export-Import Bank has agreed to make a $20,000,000 loan and the Brazilian Government will provide $25,000,000 will be a completely integrated unit from coke to finished product, located about 20 miles from Rio de Janeiro and accessible to both deep sea water and railroads. Tentatively, it is said, it is proposed to build a steelworks with an annual capacity of approximately 400,000 tons of ingots and finishing mills of about 300,000 tons of a wide range of products, such as rails, shapes, bars, tubular products and tin plate. Whether there will be one or two blast furnaces and what the pig iron capacity may be is not known.

Ore running as high as 65 per cent natural iron is available. The ore mines are about 300 miles from Rio de Janeiro on a railroad. Some of the ore has been shipped to the Sparrows Point, Md., plant of the Bethlehem Steel Co. Native coal has good coking quality but is high in ash. The best combination, it is said, would be to use part native and part imported coal. The plan for building the plant, therefore, is considered to be sound metallurgically and commercially. Experts are said to believe that production costs ought to be reasonable. United States Steel Corp. engineers who surveyed its possibilities are also reported to have indicated that the plant would be feasible, provided certain conditions could be met. Of course aside from the commercial and national defense potentialities, the American loan is intended to build up Pan-American solidarity. The loan is looked upon as an example of economic cooperation by the United States with the Southern countries that will be extended under the special act signed by President Roosevelt last Thursday making $500,000,000 available to the Export-Import Bank for Western Hemisphere lending. One particular purpose, it is said, is to build heavy industries in South America for both commercial and defense purposes.

The $20,000,000 loan for the Brazilian steel plant was announced by Federal Loan Administrator Jesse H. Jones, after prolonged negotiations with a group of Brazilians, headed by Guilherme Guinle, president of the executive commission of the Siderurgical Plan, which is the borrower.

In his letter to Mr. Jones, Mr. Guinle said that it is estimated that Brazil will need $20,000,000 to cover purchases in the United States of materials and equipment for construction of the plan. Of this sum, Mr. Guinle said, $10,000,000 will be required during the next 12 to 18 months, and the balance, up to a maximum cumulative total of $20,000,000, thereafter as the work progresses. He said that it will probably require two and a half years to complete the mill.

"If the credit is available, we will establish an office in Pittsburgh or other suitable center with a corps of engineers and executives to handle the task of the design of the mill, the purchase of the equipment, and the construction of the plant," Mr. Guinle said.

"Satisfactory provisions will be required to assure that the loan will constitute a first claim against the mill, and all legal matters in connection with the loan shall be subject to the approval of the Export-Import Bank," said Mr. Jones in his letter to Mr. Guinle. "We should also want the privilege of concurring in the selection of the managerial officers of the mill company, the engineers, and contractors, and the purchase of materials."

Personals

Change is inevitable in progressive Industry. Change is constant.

• **T. T. Watson,** who has been development and service metallurgist of Lukens Steel Co., Coatesville, Pa., since 1934, has been appointed research metallurgist in charge of all plant research. He was graduated in 1923 from the Royal Technical College, Glasgow, Scotland, with the degree of Associate of the Royal Technical College. He later joined David Colville & Sons, largest iron and steel manufacturer in Scotland, as assistant metallurgist immedately after graduation, and served in that capacity until 1925, when he became metallurgist for the Clyde Alloy Steel Co. From 1927 to 1930, Mr. Watson was assistant metallurgist at Dorman Long & Co., England. Since 1930, he has been in the United States, as a consulting metallurgist first, and for the last nine years successively as member of the metallurgical department, development and service metallurgist, and now research metallurgist for Lukens Steel.

• **Irving H. Jones** has been appointed manager of railroad sales, Allegheny Ludlum Steel Corp., Pittsburgh. Mr. Jones, who has been engaged in railroad sales work for over 20 years, was formerly manager of railroad sales for the Central Alloy Steel Corp. of Massillon, Ohio, and later held the same position with the Timken Steel & Tube Co., Canton, Ohio.

• **W. G. Sonderman** has been appointed Cincinnati branch manager for Columbia Tool Steel Co., Chicago Heights. He has been affiliated with the firm's Cleveland office for over 20 years and succeeds **F. A. Terry,** who has retired.

• **G. Cook Kimball,** executive vice-president, United States Steel Corp., who was recently transferred from Chicago to Washington, is recovering from the effects of an operation which he underwent at the Passavant Hospital in Chicago last week.

• **Arthur W. S. Herrington,** president of Marmion-Herrington Co., Indianapolis, which manufactures motorized military equipment, was the speaker at the annual banquet of the national tractor section, Society of Automotive Engineers, at the Schroeder Hotel, Milwaukee. He talked on conditions needed for faster national defense activities.

• **Warren Whitney,** former assistant to the general manager National Cast Iron Pipe, Tarrant, Ala., has been appointed manager. He succeeds **D. I. Miller,** who has retired.

• **Richard Wayland-Smith,** associated with U. S. Steel subsidiaries for more than 44 years, has retired as assistant manager of sales at the New York office of Carnegie-Illinois Steel Corp.

Mr. Wayland-Smith, aged 70, began his business career as a salesman for F. Wayland-Smith & Sons, New York, in 1893. He subsequently worked for William Clark Son's Co. of New York, and in 1899 became sales agent for American Steel Hoop Co.

Mr. Wayland-Smith joined the former Carnegie Steel Co. as a salesman in its New York office in 1901, was appointed assistant manager of sales at New York in 1910, and in 1935 was named assistant manager of sales in New York for Carnegie-Illinois Steel Corp. His retirement became effective Oct. 1.

RICHARD WAYLAND-SMITH, assistant manager of sales at the New York office of the Carnegie-Illinois Steel Corp., who has retired after an association of more than 44 years with the United States Steel Corp.

• **J. H. Hillman, Jr.,** has been elected chairman of the board of the National Supply Co., Pittsburgh, succeeding the late **John M. Wilson. A. W. McKinney** and **J. Crossman Cooper, Jr.,** were elected directors to fill two vacancies on the board.

• **Gilbert L. Wolfe,** who has been associated with the Revere Copper & Brass Co. at Rome, N. Y., and at New Bedford, Mass., has been appointed representative in the central New York State area for the American Nickeloid Co., Peru, Ill. He will make his headquarters at Schenectady, N. Y.

• **J. H. Marks,** since 1925 purchasing manager of the Packard Motor Car Co., Detroit, has been elected vice-president in charge of procurement, machinery and accessories in connection with the Rolls Royce plane engine project. He will also supervise the erection of new buildings growing out of the expanding war plane motor contract. Mr. Marks had wide experience in the World War as the Packard executive in charge of factory rearrangement and new construction for production of the Liberty aircraft motor.

• **John L. Auch** has been elected treasurer of the Pittsburgh Coal Co., Pittsburgh, succeeding **William McPherson,** retired. Mr. Auch has been with Pittsburgh Coal since 1939, prior to which time he was an official of Hoy & Co., dealers in wholesale plumbing supplies.

• **Neil H. Brown** has been appointed district representative in Charlotte, N. C., for the Northern Equipment Co., Erie, Pa.

• **Harry F. Thorne** has been made general sales manager in charge of sales of industrial, specialty and illuminating glassware, for Kopp Glass, Inc., Swissvale, Pa. He will make his headquarters at One East 42nd Street, New York.

A.I.S.E. Debates Production Problems

(CONTINUED FROM PAGE 41)

of the contained units. It is not believed it is possible to secure the maximum production from a shop unit if the shop contains more than six or seven furnaces.

Every furnace has a time constant at which it can be counted on to produce steel. Time in excess of the production constant is often the result of platform delays of transportation, scheduling and charging and these delays mount up as the number of furnaces in line increase. A study was made several years ago of materials handling delays in a 12-furnace shop and it was then definitely determined that, over a reasonable period of time, as great a tonnage of steel could be produced with from 9 to 10 furnaces operating, as could be produced when 12 furnaces were under heat, and even with 9 furnaces operating, there was substantial platform delays. Six or 7 furnace operations should reduce materials handling delay to near the zero point.

3. As the ratio of the iron component of the charge becomes larger, it is increasingly important that it be a product of the best blast furnace practice possible, if optimum steel making practice is to be achieved.

This means real interest and cooperation by the blast furnace operator, who incidentally has some very real problems of his own. The item of the phosphorus content of the ores to be used and subsequently appearing in the iron is generally without his jurisdiction but the control of sulphur and silicon in the iron is definitely in his hands. The elimination of sulphur in the open hearth process is difficult and costly, but it can be easily controlled at the blast furnace. Low sulphur should be the open hearth operators very rigid and principal specification.

Low silicon iron should be the second principal specification. The blast furnace operator will generally hold that he can not produce low sulphur and silicon jointly. While this idea is subject to debate, low silicon iron is one of the greatest aids to the steel maker's productive and cost records.

After thoroughly studying and considering the effect of silicon in iron on steel making practice the company with which Mr. Buell is associated is now prepared to offer a process intermediate to the blast furnace and open hearth for the control of silicon. This process should prove very beneficial to steel making practice and costs when the swing of silicon in iron extends much above one per cent and cannot be otherwise corrected.

Blast Furnace Gas

In the operating practice division Thursday morning a paper by J. S. Fulton of Ingersoll-Rand Co. dealt with "Factors Affecting Production of Blast Furnace Gas." The author stated that the iron blast furnace will produce a top gas containing 39 per cent by volume of CO plus CO_2 for any carbon rate with the CO/CO_2 ratio, that is, $\frac{C \text{ in } CO}{C \text{ in } CO_2}$, increasing with the carbon rate.

The reduction of the ore diminishes the CO produced at the tuyeres by the amount of CO transformed to CO_2 from the O_2 reduced from Fe_2O_3. The particular amounts of CO and CO_2 appearing in the top gas is nearly constant for a given carbon rate but is altered by the presence of hydrogen.

As an illustration of the influence of the reduction ore upon the CO/CO_2 ratio, there is a blast furnace in operation smelting phosphate rock with only a trace of iron. This furnace shows the CO as nearly 39 per cent by volume and only a minor percentage of CO_2 to cover the reduction of the trace of iron. The CO gas is produced, but because little ore is there to be reduced, little if any CO_2 is made and the CO is found in the top gas, practically unchanged.

On the opposite extreme consider a vertical shell full of ore and voids through which CO_2 is forced and no ore reduced because there is no CO and this gives the maximum amount of CO_2.

The usual blast furnace operation is somewhere between these extremes, so all that the production of pig iron does to the production of gas is to decrease the CO and increase the CO_2 in the top gas.

The pig iron production is given the most attention because it is the desired function, but possibly also because, it and the liquid slag are both visible and ponderable. At the same time these two products are leaving the bottom of the furnace, the gas, both invisible and unweighed, is leaving the top of the furnace with a weight at least three times the weight of the iron and slag combined. Here is a machine which turns out two products, each of which is a by-product of the other, and neither of which can be produced without the other. With one product weight three times the other, certainly more attention should be paid to it than in the past.

Since the reduction of the ore and the partial alteration of the CO to CO_2 are a continuous chemical reaction, it is obvious that any change in the CO/CO_2 ratio in the top gas gives an immediate report of reduction changes below, that may not be apparent at the hearth for hours. The change in the CO/CO_2 ratio is also accompanied by a change in the temperature of the top gas which also reports a change in the reduction cycle.

There is yet another phase of the furnace operation that must be considered. The CO and CO_2 appearing in the top gas indicate a previous production of heat, that was presumably sufficient to supply the heat demands for reduction of ore, calcining of limestone, liquefaction of the iron and slag, the sensible heat of the top gas, the radiation and the jacket cooling. Since we are dealing with a furnace in successful operation, which presupposes sufficient internal heat, we need not make a thermal balance but later on it will be advisable to consider alteration in the internal heat from various causes.

Some time ago the writer became interested in the trend of the CO and CO_2 curves below an 1800 lb. carbon rate as several novel methods of furnace operation were under discussion that indicated as low as 1200 lb. of carbon per gross ton.

It has been recognized for some years that while the Brassert curves gave CO and CO_2 values well in agreement above 1800 lb. that the CO/CO_2 ratios below 1800 were off. The writer felt that if the curves could be extended to include ferro-manganese furnaces that the trend of a curve between 1400 lb. and 6000 lb. carbon rates would be subject to less error in the lower ranges, than if it were developed for a shorter range.

After several false starts, consistent curves of the weight of top gas, carbonized gases and nitrogen were found to be almost exactly straight lines between 1400 lb. and 6000 lb. carbon rates.

Metal Working Activity

. . . Latest Data Assembled by The Iron Age

From Recognized Sources. In Net Tons.

	August 1940	July 1940	June 1940	July 1939	7 Months 1940	7 Months 1939
Steel Ingots:						
Monthly output[a]	6,033,037	5,595,070	5,532,910	3,564,827	34,273,194	24,523,550
Average weekly output[a]	1,361,859	1,265,853	1,289,723	806,522	1,126,296	809,625
Per cent of capacity[a]	89.72	83.40	89.47	52.74	74.20	53.09
Pig Iron:						
Monthly output[b]	4,053,945	3,818,897	2,639,022	25,137,545	16,664,075	
Raw Materials:						
Coke output[c]	4,682,073	4,842,891	4,525,526	3,401,200	31,182,331	21,935,300
Lake Ore consumed[d]	6,384,832	6,186,426	5,838,223	3,520,537	36,799,012	22,527,930
Scrap Iron consumed[e]	4,444,160	3,949,120	3,899,840	2,516,640	24,346,560	17,316,320
Castings:						
Malleable, orders[e]	52,994	45,025	36,503	29,802	263,450	223,154
Steel, orders[e]		67,035	59,661	34,804	339,041	264,960
Finished Steel:						
Trackwork shipments[a]	6,480	6,063	6,075	5,330	27,068	25,639
Fabricated shape orders[f]	109,918	189,870	109,744	114,056	809,191	780,303
Fabricated plate orders[e]			48,639	31,364	*220,323*	208,401
U. S. Steel Corp. shipments[g]	1,455,604	1,296,887	1,209,684	745,364	7,585,285	5,583,768
Fabricated Products:						
Automobile production[h]	75,873	231,703	344,636**	209,359	2,660,231	2,171,348
Steel furniture shipments[e]			$2,159,626	$1,566,978	*$13,222,332*	$12,176,995
Steel boiler orders[e] (sq. ft.)		1,680,289	1,761,312	772,094	7,239,049	6,011,187
Locomotives ordered[i]	65	51	31	4	236	156
Freight cars ordered[i]	7,645	5,846	4,235	0	16,431	9,077
Machine tool index[j]	93.3	88.3	92.3	65.8	92.3	92.0††
Foundry equipment index[k]	165.4	194.4	164.9	*	157.4	*
Gear sales index[s]	191	141.0	129.0	89.0	126.0††	92.0††
Non-Ferrous Metals: (U. S. only)						
Lead shipments[l]			49,904	42,636	*268,723*	275,042
Lead stocks[l]			55,343	124,017		
Zinc shipments[m]	64,065	57,606	53,935	43,128	371,444	288,418
Zinc stocks[m]	44,670	58,796	65,227	131,782		
Tin deliveries[n] (gross tons)	12,470	7,325	10,332	5,908	57,934	39,508
Refined copper deliveries[o]	96,383	71,226	61,716	59,681	490,093	357,092
Refined copper stocks[o]	198,730	215,823	199,586	316,543		
Exports:						
Total iron and steel[p]		1,159,131	1,048,373	575,304	5,921,056	3,612,998
All rolled and finished steel[p]		342,299	351,550	148,596	2,340,836	1,025,212
Semi-finished steel[p]		350,345	285,884	19,006	1,216,030	98,540
Scrap[p]		366,384	356,573	391,416	2,025,222	2,389,297
Imports:						
Total iron and steel[p]		3,967	6,166	34,553	48,821	232,786
Pig iron[p]		1,195	720	6,932	7,663	24,688
All rolled and finished steel[p]		1,315	1,117	16,172	12,499	134,232

Data in italics are six months' totals.

Source of data: [a] American Iron and Steel Institute; [b] The Iron Age; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp.; [h] Preliminary estimates by The Iron Age—Final figures from Bureau of the Census, U. S. only: [i] *Railway Age;* [j] National Machine Tool Builders Association; [k] Foundry Equipment Manufacturers Association; [l] American Bureau of Metal Statistics; [m] American Zinc Institute; [n] New York Commodity Exchange; [o] Copper Institute; [p] Department of Commerce; [r] Institute of Scrap Iron and Steel; [s] American Gear Manufacturers Association.

†Six months' average. ††Seven months' average. *Not available.

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	Oct. 1, 1940	Sept. 24, 1940	Sept. 3, 1940	Oct. 3, 1939
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.00
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.00
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Tin and Terne Plate:				
(Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.40
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Wire Rods and Skelp:				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	1.92
Skelp (grvd)	1.90	1.90	1.90	1.90

	Oct. 1, 1940	Sept. 24, 1940	Sept. 3, 1940	Oct. 3, 1939
Pig Iron:				
(Per Gross Ton)				
No. 2 fdy., Philadelphia	$24.84	$24.84	$24.84	$24.84
No. 2, Valley furnace	23.00	23.00	23.00	23.00
No. 2, Southern Cin'ti	23.06	23.06	23.06	23.06
No. 2, Birmingham	19.38	19.38	19.38	19.38
No. 2, foundry, Chicago†	23.00	23.00	23.00	23.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	24.34
Basic, Valley furnace	22.50	22.50	22.50	22.50
Malleable, Chicago†	23.00	23.00	23.00	23.00
Malleable, Valley	23.00	23.00	23.00	23.00
L. S. charcoal, Chicago	30.34	30.34	30.34	30.34
Ferromanganese‡	120.00	120.00	120.00	100.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

	Oct. 1, 1940	Sept. 24, 1940	Sept. 3, 1940	Oct. 3, 1939
Scrap:				
(Per Gross Ton)				
Heavy melting steel, P'gh.	$21.25	$20.50	$19.00	$24.25
Heavy melt'g steel, Phila.	20.625	20.625	20.25	23.00
Heavy melt'g steel, Ch'go.	19.75	19.75	18.625	20.25
Carwheels, Chicago	20.25	20.25	19.25	18.50
Carwheels, Philadelphia	22.75	22.75	21.25	22.25
No. 1 cast, Pittsburgh	20.25	20.25	19.75	23.75
No. 1 cast, Philadelphia	22.25	22.25	22.25	24.75
No. 1 cast, Ch'go (net ton)	17.75	17.75	17.25	17.75
Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$4.75	$4.75	$4.75	$4.75
Foundry coke, prompt	5.25	5.25	5.25	5.50
Non-Ferrous Metals:				
(Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	11.00	12.00
Copper, Lake, New York	12.00	12.00	11.00	12.125
Tin (Straits), New York	51.50	50.25	50.50	Nominal
Zinc, East St. Louis	7.25	7.25	6.50	6.50
Lead, St. Louis	4.85	4.85	4.75	5.35
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	14.00

* Mine producers only.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 93 to 102 herein.
On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices • •

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Oct. 1, 1940	2.261c. a Lb.	$22.61 a Gross Ton	$20.54 a Gross Ton
One week ago	2.261c. a Lb.	$22.61 a Gross Ton	$20.29 a Gross Ton
One month ago	2.261c. a Lb.	$22.61 a Gross Ton	$19.29 a Gross Ton
One year ago	2.236c. a Lb.	$22.61 a Gross Ton	$22.50 a Gross Ton

	FINISHED STEEL High	FINISHED STEEL Low	PIG IRON High	PIG IRON Low	SCRAP STEEL High	SCRAP STEEL Low
1940	2.261c., Jan. 2	2.211c., Apr. 16			$20.54, Oct. 1	$16.04, Apr. 9
1939	2.286c., Jan. 3	2.236c., May 16	$22.61, Sept. 19	$20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

•Ingot production unchanged at 93 per cent but orders keep piling up. Backlogs increasing, deliveries lengthening . . . Ban on scrap for Japan has little effect on prices . . . Iron and steel exports at new high record . . . Pig iron production higher in September

ALTHOUGH steel ingot production for the industry as a whole has remained almost stationary for three consecutive weeks at 93 per cent of capacity, the trend of orders and inquiries and the volume of prospective work is upward, backlogs are being accumulated and deliveries on a number of products are lengthening.

In production, shipments and aggregate tonnage of bookings, the fourth quarter may be one of the most active periods the steel industry has ever experienced, notwithstanding the fact that the bulk of the national defense requirements probably will come at a later time. At the end of the last quarter THE IRON AGE capital goods index, at 106.7, was the highest since April, 1929.

Coming on top of national defense requirements are expanding railroad purchases, which are, of course, a corollary of the defense activity, and growing production of automobiles, now approaching a weekly rate of 100,000.

During September the railroads purchased a total of 11,220 freight cars, highest monthly total since October of last year. These cars will require about 150,000 tons of steel. Traffic expansion points to the probability of a continued high volume of orders over the next several months. Already some car shortages have developed, especially in large box cars.

In addition to purchases of 1900 cars in the past week, railroads ordered 132,800 tons of rails, of which 71,300 tons is for New York Central Lines, 31,000 tons is for the Louisville & Nashville, 16,500 tons for the Baltimore & Ohio, 10,000 tons for the Virginian and 4000 tons for the Wheeling & Lake Erie. It is expected that the total rail buying movement will approximate a million tons.

THE automobile industry, facing the prospect of delayed deliveries of steel at the time of its most active selling season in the spring, is apparently bent on building up stocks of assembled cars in advance of such a contingency, and a high rate of production is expected to continue for some months.

The national defense program, which is now making most progress in its preliminary construction phase, accounts for a good share of this week's total of 56,500 tons for fabricated structural steel contracts, the largest weekly total in more than two years. Shipments of fabricated structural steel in August, totaling 124,301 tons, were the highest of any month this year.

National defense requirements are spreading to a number of products which hitherto have not been greatly affected, including pig iron, merchant pipe and sheets. Foundries are getting some indirect orders, with resultant increase in operations, which in some districts are now on a six-day week. Pig iron orders and shipments are gaining sharply.

SHELL steel orders are increasing. About 100,000 tons has been tentatively allocated to mills in the Chicago district, while 20,000 tons will be required by two Pittsburgh shell makers. The demand for forging billets and bars will not only tax the mills but will be a heavy load on forging manufacturers, even with the new forging equipment which is to be supplied by the Government. To provide for the large quantities of alloy steel that will be required, an addition of two electric furnaces with annual capacity of 100,000 net tons has been decided upon at the South Chicago works of the Carnegie-Illinois Steel Corp.

THE ban on scrap exports to Japan has had no effect on scrap prices except to halt advance at such export shipping points as New York, Boston, Philadelphia and San Francisco, but in the interior prices have again risen. An advance of 75c. at Pittsburgh carries THE IRON AGE scrap composite price to $20.54.

The question of extending the embargo to cover other products used for munitions, including steel, pig iron, copper and cotton, is being studied in Washington. Japan took 66,829 gross tons of steel from the United States in August.

Total exports of iron and steel in August, reaching 1,046,084 gross tons, broke all records and compared with 707,809 tons in July, the previous peak month. The United Kingdom took 653,866 tons and Canada 108,017 tons. The Argentine, which has lifted its temporary import embargo, imported 37,156 tons of iron and steel from the United States in August.

ESTIMATED production of coke pig iron in September totaled 4,159,700 net tons, compared with an actual production in August of 4,238,041 tons. On a daily basis September production rose to 138,600 net tons against 136,711 tons in August, or a rise of 1.4 per cent. There were 193 furnaces operating on Oct. 1, compared with 190 in blast on Sept. 1. Four furnaces were blown in and one was blown out during the month.

The Industrial Pace . . .

ACTIVITY IN THE PRODUCTION and distribution of heavy goods in the past week was at the highest rate recorded in 11 years, according to THE IRON AGE index of capital goods activity. Factors in the rapid rise of the index over the past six weeks have been the growing influence of the defense program, the steady demand from Britain, and the increased activity in the automobile industry. The index for the past week was 106.7, the highest index recorded since April, 1929, and exceeding the peak of 1937 by 0.7 point. The automobile and construction series were chief contributors to the past week's advance, with a small increase shown in the lumber carloading series. The small loss registered by the steel ingot series was due entirely to seasonal correction.

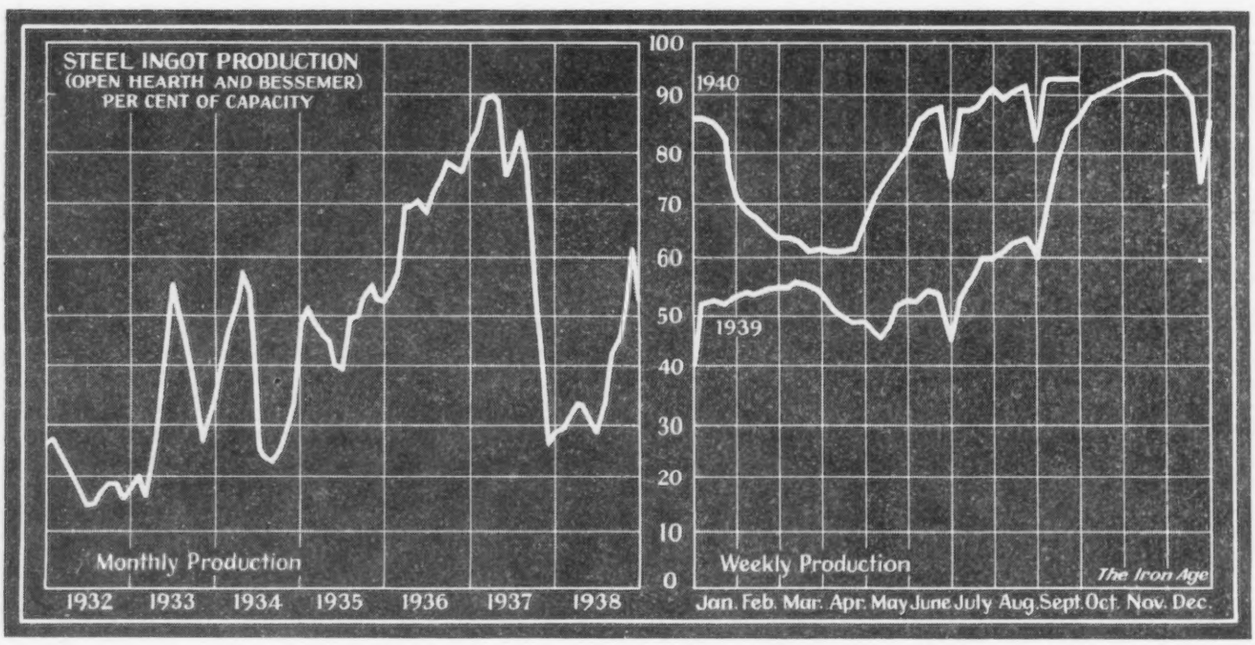
Rising 9.7 points to 108.9, as compared with 99.2 in the previous week, the automobile component is rapidly approaching the levels which were last current in January of this year. Output of 95,990 cars compared with 78,820 two weeks ago, 27,645 a month ago, and 62,755 in the comparable week of 1929.

THE HEAVY CONSTRUCTION component rose to 106.7 in the past week, highest since November, 1929. Dollar volume of awards for the week, $102,177,000, was in excess of $100,000,000 for the second consecutive week and the fourth time this year and compares with $120,809,000 in the previous week and $43,511,000 in the comparable period of 1939. Private awards of $28,493,000 were up slightly from the $26,686,000 total of the foregoing week, while public awards dropped to $73,684,000 from $94,123,000, reported a week ago.

Impetus given the construction industry by the defense program and expansion of industrial facilities is reflected in the rise in shipments of fabricated structural steel in August (see graph). August shipments were 124,301 tons, highest of any month this year, comparing with 121,315 tons in July. New bookings of structural steel dropped in August to 109,918 tons from the peak figure, 189,870 tons, in July, but it is likely that succeeding months will see a reversal of this movement.

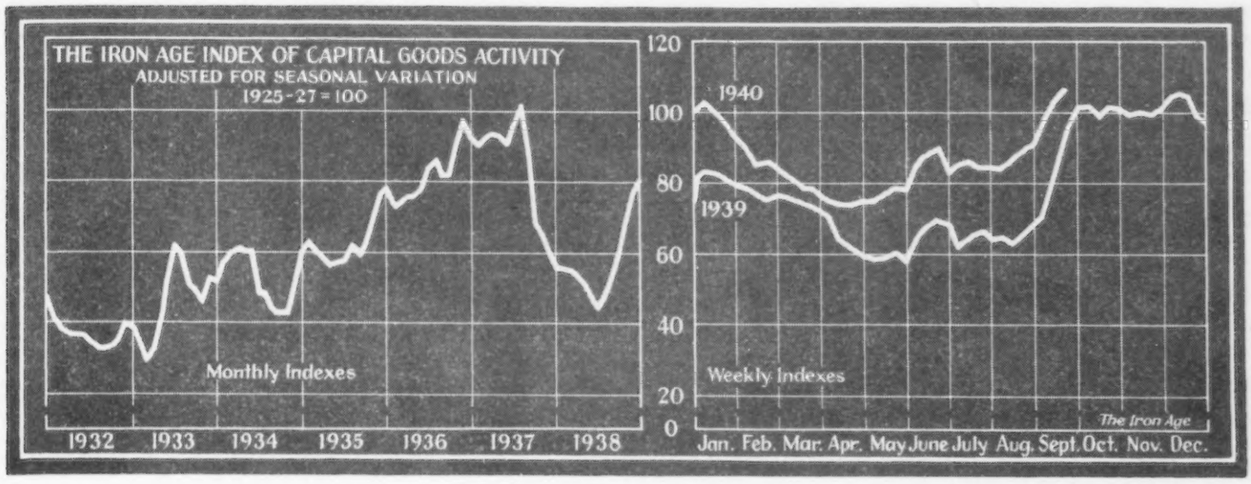
A sharp recovery in scrap prices from the July weakness has pushed prices above the previous 1940 high. From the low point of $18.17 in August, the scrap composite has advanced $2.12 in seven weeks to $20.29, the highest level since November, 1939. What effect the Japanese embargo will have is difficult to discern at present, but in view of the heavy operations of domestic steel mills and the continued strong demand from Canada and Great Britain, a sidewise movement, rather than any downward trend, would seem probable for the immediate future.

Ingot Rate Unchanged for Third Week at 93%



District Ingot Production, Per Cent of Capacity		Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
	Current Week..	89.0	97.5	87.0	93.0	88.0	104.5	104.0	94.0	105.0	105.0	69.0	96.5	76.0	**93.0**
	Previous Week..	90.0	96.0	90.0	93.0	87.0	104.5	104.0	100.0	105.0	105.0	69.0	93.5	74.0	**93.0**

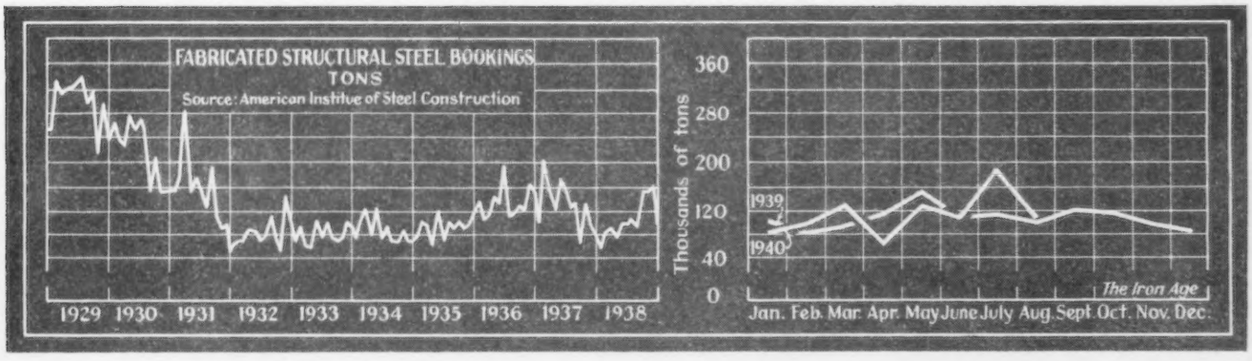
Capital Goods Index Rises to 11-Year Peak



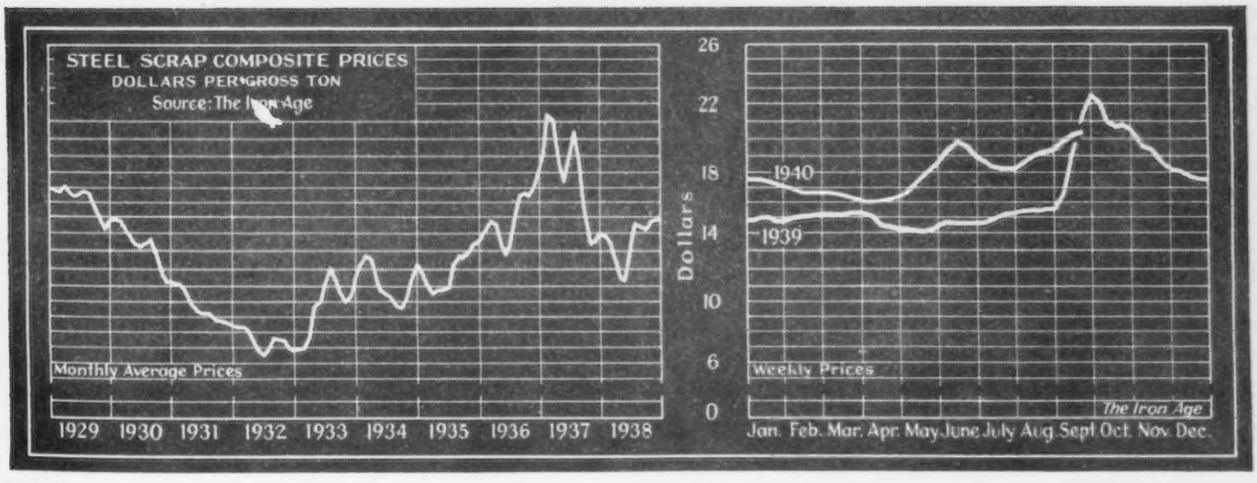
▼Component Week Ended ➤	Sept. 28	Sept. 21	Aug. 31	Sept. 30 1939	Sept. 28 1929
Steel ingot production[1]	133.5	135.8	138.9	120.6	118.8
Automobile production[2]	108.9	99.2	34.5	129.7	114.6
Construction contracts[3]	106.5	99.0	95.6	69.5	110.1
Forest products carloadings[4]	73.3	72.2	67.9	63.8	114.2
Pittsburgh output and shipments[5]	111.4	112.9	110.1	96.2	119.5
COMBINED INDEX	106.7	103.8	89.4	95.9	115.4

Sources: [1] THE IRON AGE; [2] Wards Automotive Reports; [3] *Engineering News-Record;* [4] Association of American Railroads; [5] University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended Sept. 21. Other indexes cover week of Sept. 28.

Fabricated Steel Bookings Decline, Shipments Up



Scrap Prices Gain $1 In Month, Reach New 1940 Peak



Market News

. . . THE WEEK'S ACTIVITIES IN IRON AND STEEL

New Business

. . . Some gains in September large in miscellaneous orders

Total September bookings at PITTSBURGH compared favorably with August volume. In some instances monthly totals were slightly ahead, while in other cases aggregate tonnage was fractionally lower. More important than tonnage aspect, however, was a substantial expansion in miscellaneous business, heavier automotive buying, increased support from the railroads, and a continuation of large export demand. PITTSBURGH steel makers note that total export requirements have leveled off slightly recently but this has been made up by an increase in domestic business.

With one mill reporting a gain of 40 per cent for September over August, the average gain in operations in the CHICAGO district was 25 per cent over the preceding month. Increased business traceable directly and indirectly to the defense program is given credit for the increase. And defense activity, mills report, has bolstered general demand along the line.

Orders for structural steel last week in CHICAGO showed up heavier than for any other week this year.

An order for 500,000 army cots, involving 6000 tons of angles, will shortly be placed in that district, it is reported. Steel companies are waiting for the "go ahead" signal on the huge shell order reported in THE IRON AGE last week. Low bidders on this job, which will consume over 100,000 tons of steel, have tentatively placed their tonnage with mills in the district. Formal awards are expected within the week or 10 days.

At CLEVELAND, where September's new tonnage compared closely with August on the day-to-day basis, all signs point to the next three months becoming the most active quarter of this year. Ordering for fourth quarter delivery was very brisk at the close of September at CLEVELAND.

United States and British shell steel requirements alone are sufficient to insure a very good fourth quarter. Initially, the CLEVELAND area will be counted upon to forge around 1,500,000 shells of two types, to machine around 2,500,000 shells in three types, and to supply great quantities of bomb bodies, fuses, burster casings and other parts for the United States in addition to shells for the British.

Both steel production facilities and machining capacity will be taxed under the program for the new "AXS" specification for anti-aircraft shells. The United States requirements in this type of ammunition are understood to be predicated upon what the British are shooting, and in certain areas of England 3000 tons of steel per night are being fired.

An order for 3000 to 6000 tons of steel for the fabrication of 500-lb. fragmentation bombs has been placed by the Edward G. Budd Mfg. Co., Philadelphia.

The Navy Department on Monday made its semi-annual steel award totaling 97,278 tons to these companies: Carnegie-Illinois Steel Corp., Pittsburgh, 69,646 tons; Worth Steel Co., Claymont, Del., 18,429 tons; Lukens Steel Co., Coatesville, Pa., 8344 tons, and Jones & Laughlin Steel Corp., Pittsburgh, 769 tons.

Lukens, 8434 tons as follows—Plates 7486, sheets 850, strips 98.

Worth, 18,429 tons, all plates.

Jones & Laughlin, 769 tons, bars and strips.

Carnegie, 69,646 tons—Plates 43,880, sheets 4887, strips 379, shapes 14,653, bars 5840.

Steel Operations

. . . Rate for industry continues at 93 per cent for third week

For the third consecutive week, steel ingot production is virtually unchanged at 93 per cent. There have been some gains and some losses. CHICAGO is up one and a half points to 97½ per cent. Offsetting these gains are a loss of one point at PITTSBURGH to 89 per cent, a three-point loss at YOUNGSTOWN, which is now at 87 per cent, and a six-point loss to 94 per cent at DETROIT. In other districts operations are substantially unchanged.

Pig Iron

. . . British took 97% of August exports . . . Domestic buying gains

With shipments to Great Britain more than doubling, pig iron exports in August rose to 121,948 tons from 70,790 tons in July. The August exports were largest since the peak of the 1937 movement, when 168,538 tons were shipped in July of that year. August shipments to Great Britain were 119,139 tons, or 97 per cent of all pig iron exports. Chief point of origin of exports to Britain was Philadelphia with a total of 42,144 tons. Maryland customs area was second with 35,890 tons, followed by Massachusetts district with 31,197 tons. Uruguay was largest South American buyer with 100 tons. South Africa received 531 tons and China 800 tons.

Domestic shipments of pig iron continue to expand. In all respects September was a much better month than August. At CLEVELAND, for example, September shipments compared favorably with those of the best previous month of the year, January and July, and there were indications that activity will be sustained at a high rate over the remainder of the year.

From CHICAGO there are reports of a steadily strengthening market. Foundries are accumulating inventories. In the PITTSBURGH district, where 41 blast furnaces (mostly operated by steel companies) are in blast out of 50, pig iron producers note a steady increase in new business and an expansion in the volume of shipments.

Defense requirements have begun to flow to foundries in the PHILADELPHIA district. Inquiries involve good-sized tonnages for heating and drainage facilities at Army cantonments. There is also

active interest in iron in the NEW YORK district, where foundries are taking in iron to protect themselves against the possibility of delivery delays during the winter.

In NEW ENGLAND some foundries have been unable to obtain iron as rapidly as desired from one large producer and have turned to other sources of supply.

Railroad Buying

. . . Freight car orders in September largest since October, 1939

Purchases totaling about 1900 freight cars, including cars to be built in railroad shops, were reported in the past week, bringing the total for September to 10,500 cars, highest monthly total since October, 1939, when 11,220 cars were awarded. The high point of the 1939 buying movement was the 24,231 freight cars purchased in September of that year.

The rail market has also shown new life over the past few weeks, with close to 61,500 tons reported bought in the past week alone. Pending rail inquiries amount to about 110,000 tons.

A revision in the report of the Southern Railway's car purchases, which was incorrectly credited last week to the Southern Pacific, brings total cars purchased by the Southern to 3230, allocated as follows: 1500 box cars to Pullman Standard Car Mfg. Co.; 730 gondolas to American Car & Foundry Co.; 250 gondolas to Mt. Vernon Car Co., and 750 hoppers to Pressed Steel Car Co.

Other rolling stock purchases reported include 500 hopper cars for the Soo Line awarded to Pullman Standard Car Mfg. Co. and 65 hoppers for Tennessee Central placed with Pullman Standard Car Mfg. Co. In addition to the 1000 gondolas for which the Baltimore & Ohio has issued inquiries, this road will build 1000 box cars in its own shops. The Reading will build 1000 hoppers and 50 cabooses and will convert 16 mallet locomotives from compound to simple types in its own shops at a cost of about $2,500,000.

New inquiries include 100 to 500 box cars for Wheeling & Lake Erie and five freight cars for Philadelphia Navy Yard. Lehigh Valley is expected to be in the market shortly for new freight cars. New York Central is seeking bids on 200 flat cars.

Baltimore & Ohio has ordered for prompt delivery 16,500 tons of rails, awarding 11,500 tons to Carnegie-Illinois Steel Corp. and 5000 tons to Bethlehem Steel Co. Louisville & Nashville has purchased 31,000 tons from Tennessee Coal, Iron & Railroad Co., and Virginian has bought 10,000 tons, placing 8000 tons with Bethlehem Steel Co. and 2000 tons with Carnegie-Illinois Steel Corp. Wheeling & Lake Erie has awarded 4000 tons of rails to Carnegie-Illinois Steel Corp.

Allocation of 71,300 tons of rails by New York Central is expected this week. New York Central will take 65,000 tons of that total, Pittsburgh & Lake Erie will take 4000 tons and 1800 tons will be for Indiana Harbor Belt Line.

The Erie is expected to enter the market shortly for around 20,000 tons of rails, and a substantial tonnage will be required for a new government shell loading plant near Ravenna, Ohio. Norfolk & Western is planning to spend $4,700,000 on additions and improvements, including 60 miles of new tracks, at its Roanoke, Va., yards.

Directors of Northern Pacific have authorized purchase of 35,000 tons of rails, eight heavy duty locomotives, six mallet locomotives and six diesel-electric switchers.

Carnegie-Illinois Steel Corp. will supply some 7500 tons of plates and shapes as well as other parts to Dispatch Shops, Inc., Rochester, N. Y., in connection with the 1000 cars recently purchased by Pittsburgh & Lake Erie.

* * *

• • • **M. J. Gormley,** executive assistant of the Association of American Railroads, on Tuesday denied a published report that the association's car service division had recommended the purchase of approximately 100,000 new freight cars during the next 12 months. He said that it is not known how many cars will be built next year. That, he pointed out, depends on traffic.

Semi-Finished Steel

. . . Pressure is heavy on all integrated mills

Semi-finished steel demand at PITTSBURGH is substantially unchanged from a week ago but analysis of order books is without significance owing to the fact that most integrated mills need their semi-finished steel production for their own finishing units. There are no reports, however, of shortages as far as consumers are concerned, although a continuation of swapping deals, etc., between integrated steel companies may be expected.

Bolts, Nuts and Rivets

. . . Large bolts, ¾ in. and up, advanced 6 to 12%

Lamson & Sessions Co., CLEVELAND, has announced for fourth quarter, price readjustments on certain sizes of bolts which, it is asserted, have been selling too low. Large bolts ¾ in. and larger are advanced 6 to 12 per cent. Other than that the advances necessitated by production costs are very slight. All producers at CLEVELAND report new business is steadily going forward in volume. Cap and set screw manufacturers, who have reaffirmed present published prices, report September sales climaxed the best six months in the recent history of the industry with the automotive industry actually becoming outranked by other diversified interests.

Sheets and Strip

. . . Orders improving and deliveries are lengthening

Total sheet and strip specifications at PITTSBURGH for September will fall short of the volume booked in August but the gap between the two periods has been closed up considerably within the past two weeks, reflecting a moderate improvement in miscellaneous buying recently as well as numerous fill-in orders from the automotive industry. Freight car, tank, and farm implement makers are becoming more active. The government has purchased a second lot of corn bins totaling 8277 units, 5500 having

gone to the Butler Mfg. Co. and 2777 to the Columbian Steel Tank Co. This second purchase will involve about 10,000 tons of galvanized sheets which have already been ordered from steel companies.

One CLEVELAND producer has two and one-half to three months backlog on hot rolled sheets. Another's delivery promises range from one to two months, depending on gage and size. Promises on cold rolled sheets by various Ohio producers average around four to six weeks. Order backlogs on galvanized sheets extend 40 to 60 days at some mills.

Deliveries on sheets are lengthening steadily at CHICAGO.

Sheet demand in the Southern Ohio district is consistently at the full capacity level and district mill operators indicate they can see no let-up in sight.

Structural Steel

. . . Awards of 56,500 tons, highest in over two years

Fabricated structural steel awards jumped to 56,500 tons, the highest in more than two years. Outstanding lettings include 14,000 tons for elevated highways in Brooklyn for the Triborough Bridge Authority; 11,600 tons for Long Island Railroad grade elimination at Rockaway, N. Y.; 8500 tons for the Ford aircraft plant at Dearborn, Mich.; 4000 tons at Nashville, Tenn., for the Vultee Aircraft division plant; 3240 tons for an extension to the gun assembly shop, Washington; 2500 tons for tremie trusses and wall forms for the Navy Department at Philadelphia; 1350 tons for warehouses at the Edgewood Arsenal, Md., and 1000 tons for Army construction at Albrook Field in the Canal Zone.

New structural steel projects advanced to 27,850 tons from 13,015 tons last week. Sizable inquiries are 7000 tons for a bridge across the Mississippi River at Clayton, Mo.; 2700 tons for hangars at Anchorage, Alaska; 2600 tons for 32 government warehouses at Arsenal, Utah; 2200 tons for the Atlantic Avenue subway in Brooklyn for the Long Island Railroad; 2000 tons for a warehouse, shipping and enameling buildings for the Republic Steel Corp., Cleveland; 1500 tons at Niagara Falls, N. Y., for the Bell Aircraft Corp.; 1500 tons for a seaplane hangar at Alameda, Cal., and 1200 tons for an assembly and office building for the Packard Motor Car Co., Detroit.

Structural mills at PITTSBURGH operated at virtual capacity in the past week, backlogs continued to pile up, but deliveries have been speeded up some. National defense jobs are pouring in and two recent projects involving work at the Philadelphia and Norfolk Navy yards will take more than 22,000 tons of steel sheet piling, the order having been awarded.

Financing is said to have been completed for a bridge across the Mississippi River at Jefferson Barracks in St. Louis County requiring 7000 tons of shapes. Sverdrup & Parcel, St. Louis, are the engineers.

Shipbuilding

. . . 10,800 tons of steel in three ships awarded

Approximately 10,800 tons of steel will be required in the construction of three cargo ships, contract for which was awarded the Moore Dry Dock Co., of Oakland, Cal., last week by the Maritime Commission.

To cost a total of $8,550,000, the three ships will accommodate 38 passengers and are designed to carry bauxite for the Aluminum Co. of America.

Wire Products

. . . Mills are heavily loaded in some divisions

The wire industry is greatly overloaded in some departments and gradually approaching capacity in other divisions, reports CLEVELAND, pointing out that this unbalanced situation is entirely natural due to the diversity of products offered. Very large backlogs are held in rods, certain special wires and some types of manufacturers wire. Rope and cable divisions are booked to capacity. After a long lull, the merchants' field is experiencing a lively pick-up in demand, brought on by seasonal rural requirements and heavy Government orders for barrack construction projects.

Total wire sales at PITTSBURGH continue to expand, improvement being noted in wire rods, manufacturers' wire and merchant wire products.

Merchant Bars

. . . Deliveries run from four to eight weeks as orders accumulate

Hot rolled bar demand at PITTSBURGH improved moderately in the past week and deliveries are still running from four to six weeks, with some sizes not obtainable in less than seven or more weeks. Requirements from automotive centers remain at fair levels, while demand from shell makers who have or will soon have Government contracts are steadily expanding. Deliveries on hot rolled alloy bars are no better than a week ago and this product continues in exceptionally good demand.

Bars continue the most active product in CHICAGO, definitely traceable to the defense program. The huge shell order, which will top 100,000 tons of steel, naturally holds the spotlight. One producer there has received an inquiry for 27,000 tons of billets from one of the low bidders in this order. It is understood that most of the low bidders have indicated the producers who will receive their tonnage on the job which includes five different sizes of shells and 500 lb. demolition bombs. All are waiting for formal awards expected this week or within 10 days. Inquiries are being let for 500,000 army cots, not less than 5000 nor more than 100,000 to a single bidder. The entire order involves 6000 tons of 2 in. x ½ in. x ⅛ in. angles. An inquiry is also out in that district for an undetermined quantity of 30 lb. fragmentation bombs.

With sales volume brisk, CLEVELAND producers are quoting six to eight weeks' delivery on hot rolled carbon bars and have on the books considerable tonnage for shipment in later weeks.

Iron Ore

. . . Shipments in September record for that period

September vessel shipments of Lake Superior iron ore totaled 9,998,618 gross tons, an all time record for the month, according to the Lake Superior Iron Ore Association, Cleveland. The total movement to Oct. 1 is 48,235,227 gross tons, against 30,360,774 tons to Oct. 1, 1939. In September last year the movement was 7,865,007 tons.

Plates

. . . Backlogs are being built up and deliveries are longer

Plate requirements have been flowing to PITTSBURGH mills in such volume recently that backlogs have been built up further and deliveries on some widths and gages extend to eight weeks or more. Even on the narrower widths, mills have been forced to revise shipping promises.

Greatest demand at CHICAGO for plates is in the wide, heavy sizes. Fabricating shops there are working on heavy schedules with general demand strong. Business is being booked from three to four weeks ahead.

One CLEVELAND producer reports delivery promises on new business now average around two months in the future with wide mills particularly well engaged.

Continued improvement in miscellaneous bookings, including those from electrical equipment manufacturers, and a brisk export demand, has given further support to the plate market in the Philadelphia area.

Buying by fabricators, tank builders, warehouses and railroad equipment makers in New York expanded slightly in the past week. A feature of the export market is Japanese inquiries for about 9000 tons of plates.

Tubular Goods

. . . Merchant pipe demand aided by defense construction

Cleveland reports September proved one of the best months this year, particularly in merchant pipe. One electric weld mill unit is booked solidly into November.

Tubular goods sales at PITTSBURGH are substantially unchanged from a week ago.

Tin Plate

. . . No pick-up in demand expected for some time

Tin plate operations continue unchanged this week at 41 per cent. The outlook for new business remains as dull as it was a week ago and prospects for export tonnage are even a darker hue. Extreme tension in the Far East precludes any fresh business from that area for some time.

Acute Shortage of Coke Unlikely

Pittsburgh

• • • **Barring an extremely** severe winter, an acute shortage of coke supplies for the manufacture of pig iron is not expected by iron and steel operating authorities here. A temporary tightness may materialize but reliable sources believe steel ingot output could reach 100 per cent of capacity with no bottlenecks apparent in the coke supply and some are of the opinion that this level could be exceeded without encountering a critical shortage of coke.

This opinion is, of course, predicated on the use of available beehive coke ovens which are supplementing and will continue to supplement by-product coke production, which is now operating at virtual capacity. Steel companies rely on the marginal beehive coke production during unusual peak periods rather than build up by-product coke capacity to a level where a portion of this capacity would be only used in extreme periods of activity.

Reflecting the balance between coke supply and demand at the present time, it is noted that the U. S. Steel Corp., subsidiary, the H. C. Frick Coke Co., recently put into operation 400 beehive ovens in the Connellsville region, but most of the output from these ovens will go to an independent merchant pig iron producer.

If necessary, the leading steel interest could, within short notice, bring into operation more than 600 of its own beehive coke ovens in the Connellsville region which would furnish them in excess of 30,000 tons of coke a month. This beehive coke tonnage would obviously be in addition to that now being supplied to the independent merchant pig iron producer. However, at the present time the H. C. Frick Coke Co. continues to buy furnace coke from independent beehive operators rather than bring in all of its own beehive coke ovens.

By the early part of next year, additional and modernized by-product coke capacity will be added to the iron and steel industry which will, to some extent, relieve pressure in certain quarters, should the steel operating rate be at record levels.

Bethlehem Steel Co. is modernizing and rebuilding 51 ovens at Bethlehem, Pa., and recently let a contract for 76 ovens at Buffalo. Early in February it is expected that the Carnegie-Illinois Steel Corp. will have available for use 142 ovens now under construction at its Gary works, this being a replacement project. The Connecticut Coke Co. at New Haven, Conn., is now constructing nine ovens. In addition to this, there are at a few points throughout the country by-product plants which can be brought into operation in case of an emergency.

Embargo May Extend To Pig Iron, Steel

Washington

• • • **Reports that** the order embargoing exports of scrap to Japan may be expanded to include pig iron, steel, and non-ferrous metals as well as other products appear to be strengthened by a White House order on Tuesday of the present week. This order broadened the export licensing system to include fire-control instruments, military searchlights, aerial cameras and other types of military equipment containing optical elements.

Firth Sterling Reduces Prices on Carbide Tools

McKeesport, Pa.

• • • **Firth Sterling** Steel Co. here recently reduced prices on sintered carbide tools and dies, which took effect as of Sept. 3. The new prices make it possible to manufacture or purchase carbide tipped tools at cost approximating those of solid high speed steel tools, according to the company.

Consult Defense Board on "Plant Drafts"—Roosevelt

Washington

• • • **President Roosevelt** last week instructed the War and Navy Departments to consult the National Defense Advisory Commission before taking any action against recalcitrant firms under the new law which permits the government to commandeer plants.

Machine Tools

. . . SALES, INQUIRIES AND MARKET NEWS

September a Big Month

Cincinnati

• • • **The Cincinnati market** continues to be steadily busy. The bulge in machinery demand in September was greater than during the preceding month, and so far as manufacturers can see, there is unlikely to be any diminution in buying throughout this quarter. Buying continues to be on a broad base, so far as domestic demand is concerned, but foreign sales have now virtually become confined to British business. Of course, this is largely the result of the export licensing setup. Some manufacturers still report that they are occupied to some degree in transferring old French orders over to the British, but this is not general in the market. Virtually all types of tools are in strong demand, with lathes, cutter grinders and milling machines most active on current lists.

Big Programs Being Released

Detroit

• • • **All of the big** machine tool buying projects in Detroit linked with the defense program are in the active stage now, with the beginning of buying by Packard for manufacture of the Rolls Royce airplane engine. After months of preliminaries, during which tooling was planned and equipment requirements scheduled, the Packard project "broke" last week and a considerable quantity of equipment has already been ordered. The other major machine tool programs which are occupying most of the time of dealers and machine tool companies in this area are at Ford, for the Pratt & Whitney engine, Chrysler for the tank arsenal and AC Spark Plug for the GM machine gun contract. Announcement late last week that the heavy press plant of General Motors at Lansing will turn out shells does not mean much in the way of equipment buying now, it appears. This plant has been in the process of reconstruction and re-equipping in recent months, although it was planned to manufacture automotive products for Oldsmobile and Pontiac there. However, tool and die work for this plant is ready to start.

The best deliveries now are reported running at about 16 weeks from date of order, with 22 weeks considered the average for heavy equipment, according to at least one of the major suppliers.

Defense Industries Active

Cleveland

• • • **From every standpoint** September was a highly satisfactory month here, above the average of the recent past. Large purchases by such companies as Chrysler, Packard, Ford, Saginaw Steering Wheel and AC Spark Plug, all in connection with defense work, on top of heavy awards by the aviation field and diversified industries, enabled the month to close with a flourish.

At Cleveland, Youngstown, Toledo and Columbus several big shell propositions are active. Among the sizes to be forged and machined are 75, 90, 105 and 155-mm. shells, 3-in. AA and .25-cal. and .38-cal. cartridges; all for the United States Government, and 3, 4 and 6-in. shells for the British. Construction has started on the new $14,000,000 shell loading plant near Ravenna. Transmissions and other parts for 50-ton tanks will be made in northern Ohio.

It is reported unofficially that a Cleveland company not in the machine tool industry is likely to undertake manufacture of the new automatic lathe designed for the Government.

One downstate lathe manufacturer is now promising 26 weeks' delivery on 10, 12 and 14-in. lathes. Promises are even more extended on bigger lathes.

Deliveries the Main Problem

Chicago

• • • **The machine tool situation** in the Chicago district (and probably the entire country) can be described in one word—deliveries! The situation grows worse each week as new orders pile in directly and indirectly from the defense program and manufacturers' production schedules daily get more involved. With priorities becoming more and more frequent, some dealers believe that a tie-up in production and delivery schedules is not impossible. National Advisory Defense Commission is already holding up shipments to Japan and Russia, and issuing priorities on domestic orders. With most manufacturers claiming an average delivery of six months—in some cases certain sizes cannot be delivered before early 1942—increase in preference classification orders can easily cause difficulty. Practically all machine tool business in the Chicago area is traceable to the defense program and buyers are clamoring for any kind of tools they can get.

High Level Activity in East

New York

• • • **September business** exceeded or was at least equal to the preceding record breaking month, and the defense program has yet to show its full effect upon this market. While some of the big industrial firms that have received ordnance contracts have already made commitments for machine tools running into millions of dollars, there is still a great deal of this business in the negotiation stage. Wright Aeronautical Corp. has bought some specially tooled equipment for its southern Ohio plant, plans for which were recently announced, but there is a much greater volume of buying yet to be done. Substantial lists of machine tools have been issued by two local shipyards which are planning additional shop facilities in connection with Navy contracts. Railroads are also inquiring for machinery and a small amount of buying has taken place, the first from this source in a long time. Practically all buying is in connection with defense industries, and even the railroad activity can be considered as being stimulated by the rearmament program.

Deliveries continue to grow longer. First line companies are now quoting May to July, 1941. Secondary lines are in much better shape and are beginning to share to a greater extent in the upsurge of buying that has taken place in the last few months.

Non-Ferrous Metals

. . . MARKET ACTIVITIES AND PRICE TRENDS

New York, Oct. 1—With all indications pointing to a continuation of heavy demands for non-ferrous metals for some time, government defense requirements constituting a strong factor in the background, prices of all major metals remained firm and unchanged during the past week. It is felt that the government's attitude toward market price fluctuations will have considerable influence in stabilizing present price levels.

Sellers report a slackening off from the heavy demand earlier in the week, a moderate volume of inquiries being received for electrolytic copper at 12c. per lb., delivered Connecticut Valley. As the result of very heavy transactions during the last month, buyers have now taken in enough metal to meet requirements for the near future. Their fear of inadequate future supplies having been lessened in some degree, sellers are not encountering as much pressure as they have been up until very recently. A possible embargo on copper which may follow on the heels of the scrap iron and steel embargo, brought out sizable inquiries by Japanese interests.

Tin

Intensified apprehension over the Indo-China situation stiffened the market here considerably during the past week. Straits metal rose in the week from 50.25c. to 51.50c. a lb., delivered, New York. Consumers, although seeing no change in prospective requirements, apparently were concerned over stock piles and wanted to prepare for contingencies. The week began with only moderate activity, but as it wore on the buying movement spread and by week's end it had attained large proportions. Substantial tonnages of nearby tin were taken. Demand at the higher price level has been sufficient to absorb all metal offered. Virtually all activity was in prompt material, most buyers showing a little interest in November shipments from the Far East.

Zinc

The price advance of $8 a ton two weeks ago had less effect on the market situation than the report concerning possible government intervention in the market. On the surface the market seems quieter and buying pressure a little less insistent, although sellers report that the volume of inquiry and the desire on the part of buyers to obtain supplies has not materially lessened. Since supply facilities are now being and have been for some time, taxed to their utmost, any alleviation of the tightness through an addition to the present flow is improbable. Sales during the past week were well above those of the preceding period, orders for prime Western booked amounting to 9031 tons, as compared with 5229 tons two weeks ago. Shipments were slightly lower, standing at 5653 tons, as against 6328 tons in the week previous. Backlogs now total 88,464 tons.

Lead

The recent price advance seemed to offer little restraint to buyers, who continued to press sellers for material in quantities which the latter were not always ready to supply. A very good volume of transactions during the past week has practically cleaned up September requirements and, October needs now being in excess of 70 per cent covered, producers are expected to open next month's books shortly. In several instances during the week orders had to be carried over a day. The present week opened very well, sellers reporting a very busy day Monday. Prices are firm at 5c. a lb., New York.

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Scrap . . . MARKET ACTIVITIES AND QUOTATION TRENDS

• • • **While brokers** and mill buyers generally have adopted a very cautious attitude since suspension of export licenses to Japan was announced, no weakness attributable to this development has yet appeared in any district market. To the contrary, higher prices on various items are reported this week in PITTSBURGH, CLEVELAND, YOUNGSTOWN, CHICAGO, BUFFALO, BIRMINGHAM and ST. LOUIS. Seaboard markets, such as NEW YORK, PHILADELPHIA, BOSTON, and the PACIFIC COAST, which should be most sensitive to a cessation of Japanese shipments, are unchanged this week. Outside of a corrective movement of minor proportions, it appears unlikely that the Japanese embargo will have any important influence on domestic price levels. A rise of 75c. in the average at PITTSBURGH caused THE IRON AGE composite price for this week to advance 25c. to $20.54. The average composite price for September was $19.91, as compared with $18.72 in August and $21.48 in October, 1939, the peak for that year.

(Further details on the suspension of scrap export licenses will be found on page 68)

Pittsburgh

With sales of No. 1 heavy melting being made into consumption at least one point at $21.50 or better, and with numerous broker sales being consummated involving delivery of No. 1 steel into the Valley district, No. 1 heavy melting is quoted this week at $21 to $21.50, up 75c. from last week's average. Secondary grades continue strong. The position and significance of No. 1 steel in this district remains a paradox. A number of steel companies are either buying no No. 1 at all or are using small amounts. The largest steel maker in the district remains on the sidelines as far as No. 1 heavy melting is concerned, while two other integrated mills have found it expedient to exchange pig iron for scrap. Until such time as conditions change, the trend of No. 1 heavy melting quotations must be appraised on the basis of what few consumer sales are being made, as well as broker activity.

Chicago

Through the flurry of excitement created by the scrap embargo, the fact emerges that No. 1 heavy melting remains unchanged from last week at $19.50 to $20. Transactions have slowed down, apparently due to the desire to watch and wait. General agreement is that the embargo will not affect the Chicago market and that the slight reaction is temporary.

Youngstown

Price of No. 1 heavy melting is up $1 to a range of $21 to $21.50 this week. The first railroad list this month is understood to have scored a slight advance. At the start of this week scrap was coming out more freely. However, receipts at Warren were cut back at the start of this week and one Youngstown mill consumer was still shut off from new arrivals.

Cleveland

No. 1 heavy melting is quoted up 50c. to $20 to $20.50 this week. Late Monday and early Tuesday the market appeared to be taking a turn toward easiness and scrap was being offered more freely. The principal railroad list closed here Tuesday and appeared destined to yield around $22 to $22.50 for consumption elsewhere.

Buffalo

Market undertone continues exceptionally strong, with an increase of 50c. on most items. A sale of 10,000 tons of No. 2 steel was made within the $18 to $18.50 range, the equivalent of $20 to $20.50 for No. 1 heavy melting. The last sale of No. 1 was made at $20. Dealers believe the ban on exports to Japan will have little, if any, softening effect on the local market.

St. Louis

The market here advanced 50c. on most items, following sales to several mills in the St. Louis district. The embargo on shipments to Japan has thus far had no effect on the market.

Philadelphia

The market here continues very firm and unaffected by the absence of important mill buying. Railroad specialties are up 50c. to $25.50 to $26 on the basis of small sales. Mill stockpiles are in fair shape but it is felt that much additional scrap will be shipped before bad weather comes.

Cincinnati

Announcement of embargo on shipment of scrap to Japan brought a relaxation in the southern Ohio market. Up until the time of the announcement, the market was moving strongly, with mill interests taking virtually all material offered, while dealers were bidding the market up steadily to protect their commitments. Following the embargo announcement, dealers sought cover to await the general effect on the market.

Detroit

Broad differentials in prices offered by brokers in the Detroit area have become apparent at the same time that sentiment, while holding firm in some quarters, seem to break in others. Continued lack of buying on the part of mills, the scrap embargo and probable speculation for large quantities of scrap being produced locally have been disturbing influences. The prices quoted this week in the Detroit area show some decreases along with sharp upswings.

Birmingham

The scrap situation here is confused following the President's embargo on shipments to Japan. Increased prices as of Sept. 15 have brought in additional supplies to this district.

Boston

Exports to Canada and England continue at unchanged prices. Little material is leaving New England for the Pittsburgh district, but there is a fairly substantial movement of breakable cast, steel turnings, bundled skeleton and stove plate to eastern Pennsylvania, both by rail and barge. Textile machinery makers in Massachusetts have taken tonnages of textile and machinery cast, generally at $19 to $20, delivered.

New York

There has been some speed up of Japanese shipments since announcement of suspension of licenses, but difficulty in obtaining bottoms is hindering efforts. Freight rates have risen sharply on Japanese shipments and as high as $20 has been asked for a ship for prompt loading. No reaction has been observed yet in this market, but some form of a minor correction is expected. Reports that Japan is endeavoring to obtain 150,000 tons of scrap from Mexico, an accumulation of an extended period, revives again a proposition that has been before the scrap trade on and off for the past six months. Originally this material was associated with attempts to have Japan build an oil line from the Mexican seaboard to the oil lands.

Pacific Coast

It is generally expected that a scramble by brokers for scrap to fill export commitments prior to the embargo deadline will result in temporary substantial leavening of Pacific Coast prices followed by strong deflationary tendencies after Oct. 15. Pacific Coast mills will probably be able to stay out of the market until after that date. Licenses already issued for export before the embargo call for the shipment of far more material than is readily available in this market. For instance, licenses in the San Francisco customs district alone call for the export of 23,813 tons before the embargo, while only 59,044 tons were shipped from that district during the entire year of 1939.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$21.00 to $21.50
Railroad heavy mltng..	22.00 to 22.50
No. 2 heavy melting..	19.00 to 20.00
Railroad scrap rails...	22.50 to 23.00
Rails 2 ft. and under..	25.50 to 26.00
Comp. sheet steel.....	21.00 to 21.50
Hand bundled sheets..	20.00 to 20.50
Heavy steel axle turn.	19.50 to 20.00
Heavy steel forge turn	18.50 to 19.00
Machine shop turnings	15.50 to 16.00
Short shov. turnings..	17.00 to 17.50
Mixed bor. & turn.....	14.00 to 15.00
Cast iron borings.....	14.00 to 15.00
Cast iron carwheels...	21.00 to 21.50
Heavy breakable cast.	17.00 to 17.50
No. 1 cupola cast.....	20.00 to 20.50
RR. knuckles & coup.	27.00 to 27.50
Rail coil springs.....	27.00 to 27.50
Rail leaf springs.....	27.00 to 27.50
Rolled steel wheels....	27.00 to 27.50
Low phos. billet crops.	27.00 to 27.50
Low phos. punchings..	26.00 to 27.00
Low phos. heavy plate.	25.00 to 26.00
Railroad malleable ...	24.00 to 24.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$20.50 to $20.75
No. 2 hvy. mltng. steel.	19.50 to 19.75
Hydraulic bund., new.	20.50 to 20.75
Hydraulic bund., old...	17.50 to 18.00
Steel rails for rolling..	25.00 to 26.00
Cast iron carwheels...	22.50 to 23.00
Hvy. breakable cast...	.... 21.00
No. 1 cupola cast.....	22.00 to 22.50
Mixed yard (f'd'y) cast	19.00 to 19.50
Stove plate (steel wks.)	17.50 to 18.00
Railroad malleable	22.50 to 23.00
Machine shop turn....	14.50 to 15.00
No. 1 blast furnace...	13.00 to 13.50
Cast borings	13.00 to 13.50
Heavy axle turnings..	19.00 to 19.50
No. 1 low phos. hvy...	25.00 to 25.50
Couplers & knuckles..	25.00 to 25.50
Rolled steel wheels....	25.00 to 25.50
Steel axles	23.50 to 24.00
Shafting	25.00 to 25.50
Spec. iron & steel pipe	18.00 to 18.50
Cast borings (chem.)..	14.00 to 14.50

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy mltng. steel	$19.50 to $20.00
Auto. hvy. mltng. steel alloy free	18.50 to 19.00
No. 2 auto steel.....	16.25 to 16.75
Shoveling steel.....	19.50 to 20.00
Factory bundles	19.00 to 19.50
Dealers' bundles	17.50 to 18.00
No. 1 busheling	18.50 to 19.00
No. 2 busheling, old...	11.50 to 12.00
Rolled carwheels	23.25 to 23.75
Railroad tires, cut	23.00 to 23.50
Railroad leaf springs..	23.00 to 23.50
Steel coup. & knuckles.	23.00 to 23.50
Axle turnings	18.75 to 19.25
Coil springs	24.00 to 24.50
Axle turn. (elec.).....	19.75 to 20.00
Low phos. punchings..	22.50 to 23.00
Low phos. plates 12 in. and under	22.50 to 23.00
Cast iron borings	13.25 to 13.75
Short shov. turn.	14.00 to 14.50
Machine shop turn....	13.00 to 13.50
Rerolling rails	24.00 to 24.50
Steel rails under 3 ft..	23.00 to 23.50
Steel rails under 2 ft..	23.50 to 24.00
Angle bars steel	22.00 to 22.50
Cast iron carwheels ...	20.00 to 20.50
Railroad malleable	23.00 to 23.50
Agric. malleable	17.50 to 18.00
	Per Net Ton
Iron car axles	24.50 to 25.00
Steel car axles	23.00 to 23.50
Locomotive tires	18.00 to 18.50
Pipes and flues	13.50 to 14.00
No. 1 machinery cast..	17.50 to 18.00
Clean auto. blocks	18.00 to 18.50
No. 1 railroad cast.....	16.50 to 17.00
No. 1 agric. cast.....	16.00 to 16.50
Stove plate	12.50 to 13.00
Grate bars	14.00 to 14.50
Brake shoes	14.25 to 14.75

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$21.00 to $21.50
No. 2 hvy. mltng. steel.	20.00 to 20.50
Low phos. plate	23.50 to 24.00
No. 1 busheling	20.25 to 20.75
Hydraulic bundles	20.50 to 21.00
Machine shop turn....	14.00 to 14.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$20.00 to $20.50
No. 2 hvy. mltng. steel.	19.00 to 19.50
Comp. sheet steel.....	$19.50 to $20.00
Light bund. stampings	16.00 to 16.50
Drop forge flashings...	19.00 to 19.50
Machine shop turn....	12.50 to 13.00
Short shov. turn.....	13.00 to 13.50
No. 1 busheling	19.25 to 19.75
Steel axle turnings....	19.00 to 19.50
Low phos. billet and bloom crops	24.00 to 24.50
Cast iron borings.....	14.00 to 14.50
Mixed bor. & turn.....	14.00 to 14.50
No. 2 busheling	14.00 to 14.50
No. 1 cupola cast.....	22.00 to 22.50
Railroad grate bars...	15.00 to 15.50
Stove plate	15.00 to 15.50
Rails under 3 ft.	25.00 to 25.50
Rails for rolling	24.00 to 24.50
Railroad malleable	23.00 to 23.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$20.00 to $20.50
No. 2 hvy. mltng. steel.	18.00 to 18.50
Scrap rails	21.50 to 22.00
New hvy. b'ndled sheets	18.00 to 18.50
Old hydraul. bundles..	16.50 to 17.00
Drop forge flashings...	18.00 to 18.50
No. 1 busheling	17.75 to 18.25
Machine shop turn.....	13.00 to 13.50
Shov. turnings	14.50 to 15.00
Mixed bor. & turn.....	13.00 to 13.50
Cast iron borings.....	13.00 to 13.50
Knuckles & couplers..	24.00 to 24.50
Coil & leaf springs....	24.00 to 24.50
Rolled steel wheels...	24.00 to 24.50
No. 1 machinery cast.	20.50 to 21.00
No. 1 cupola cast.....	19.00 to 19.50
Stove plate	16.00 to 16.50
Steel rails under 3 ft...	25.00 to 25.50
Cast iron carwheels...	18.50 to 19.50
Railroad malleable ...	22.50 to 23.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting.	$17.00 to $17.50
No. 1 hvy. melting....	16.00 to 16.50
No. 2 hvy. melting.....	16.25 to 16.75
No. 1 locomotive tires.	18.00 to 18.50
Misc. stand. sec. rails.	19.75 to 20.50
Railroad springs	21.00 to 22.00
Bundled sheets	12.50 to 13.00
Cast bor. & turn.....	9.50 to 10.00
Machine shop turn.....	10.00 to 10.50
Heavy turnings	13.00 to 13.50
Rails for rerolling.....	22.50 to 23.50
Steel car axles	23.00 to 23.50
No. 1 RR wrought.....	14.00 to 14.50
No. 2 RR wrought.....	16.50 to 17.00
Steel rails under 3 ft..	22.25 to 23.25
Steel angle bars	19.00 to 19.50
Cast iron carwheels...	19.50 to 20.00
No. 1 machinery cast..	19.50 to 20.00
Railroad malleable ...	19.50 to 20.00
Breakable cast	16.75 to 17.25
Stove plate	13.00 to 13.50
Grate bars	13.50 to 14.00
Brake shoes	14.50 to 15.00

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	$16.25 to $16.75
No. 2 hvy. mltng. steel.	14.75 to 15.25
Scrap rails for mltng...	21.75 to 22.25
Loose sheet clippings..	11.75 to 12.25
Hyd'lic bundled sheets	15.50 to 16.00
Cast iron borings.....	7.75 to 8.25
Machine shop turn....	8.75 to 9.25
No. 1 busheling	12.25 to 12.75
No. 2 busheling	6.50 to 7.00
Rails for rolling	23.25 to 23.75
No. 1 locomotive tires.	18.50 to 19.00
Short rails	23.75 to 24.25
Cast iron carwheels...	17.75 to 18.25
No. 1 machinery cast..	20.25 to 20.75
No. 1 railroad cast....	18.75 to 19.25
Burnt cast	12.25 to 12.75
Stove plate	12.25 to 12.75
Agricul. malleable	16.75 to 17.25
Railroad malleable	19.75 to 20.25
Mixed hvy. cast.....	17.50 to 18.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	$18.00
No. 2 hvy. melting steel	17.00
No. 1 busheling	16.00
Scrap steel rails	17.00
Steel rails under 3 ft...	19.50
Rails for rolling.....	20.00
Long turnings	7.50
Cast iron borings	8.50
Stove plate	11.00
Steel axles	18.00
No. 1 RR wrought.....	16.00
No. 1 cast	17.00
No. 2 cast	13.00
Cast iron carwheels....	17.00
Steel carwheels	18.00

DETROIT

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 heavy melting..	$16.00 to $16.50
No. 2 heavy melting..	15.00 to 15.50
Borings and turnings..	11.50 to 13.25
Machine shop turnings	12.00 to 12.50
Long turnings	10.25 to 10.75
Short shov. turnings..	12.00 to 13.75
No. 1 cast	18.50 to 19.00
Automotive cast	18.50 to 19.00
Hvy. breakable cast...	15.00 to 15.50
Stove plate	12.25 to 12.75
Hydraul. Comp. sheets	18.50 to 19.50
New busheling	16.75 to 19.50
Sheet clips	14.00 to 16.00
Flashings	15.50 to 16.00
Low phos. plate	20.00 to 21.00

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	$16.00 to $16.50
No. 2 hvy. mltng. steel.	15.00 to 15.50
Hvy. breakable cast...	17.00 to 17.50
No. 1 machinery cast.	18.00 to 18.50
No. 2 cast	15.50 to 16.00
Stove plate	13.00 to 13.50
Steel car axles	20.00 to 21.00
Shafting	20.00 to 20.50
No. 1 RR. wrought....	14.50 to 15.50
No. 1 wrought long....	13.00 to 13.50
Spec. iron & steel pipe	12.00 to 12.50
Rails for rolling	19.00 to 19.50
Clean steel turnings*..	10.00 to 10.50
Cast borings*	8.50 to 9.00
No. 1 blast furnace....	8.50 to 9.00
Cast borings (chem.)..	10.00 to 11.00
Unprepared yard scrap	8.50 to 9.00
Light iron	6.50 to 7.00

Per gross ton delivered local foundries:

No. 1 machin. cast.....	$19.00
No. 2 cast .....$16.00 to	16.50

* $1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

Breakable cast .....$15.25 to	$15.50
Machine shop turn.... 9.00 to	9.25
Mixed bor. & turn..... 7.25 to	7.50
Bun. skeleton long.... 12.00 to	12.50
Shafting ..... 19.25 to	19.50
Stove plate ..... 12.25 to	12.50
Cast bor. chemical..... 9.50 to	9.75

Per gross ton delivered consumers' yards:

Textile cast .....$17.00 to	$21.00
No. 1 machine cast.... 17.00 to	20.00

Per gross ton delivered dealers' yards:

No. 1 hvy. mltng. steel.	$15.00 to $15.50
No. 2 steel	14.00 to 14.25

PACIFIC COAST

Per net ton delivered to consumer:

	San Fran.		Los Ang. Seattle
No. 1 hvy. mltng. steel $13.50		to	$14.00
No. 2 hvy. mltng. steel	$13.00		
Bundles	12.00		

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel.....	$12.00	$11.50
No. 1 hvy. mltng. steel.	11.25	10.75
No. 2 hvy. mltng. steel.	9.75	9.25
Mixed dealers steel...	8.75	8.25
Drop forge flashings...	9.75	9.25
New loose clippings...	8.75	8.25
Busheling	6.00	5.50
Scrap pipe	7.75	7.25
Steel turnings	7.25	6.75
Cast borings	6.75	6.25
Machinery cast	20.00	19.00
Dealers' cast	19.00	18.00
Stove plate	15.00	14.50

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel.	$16.50 to $17.00
No. 2 hvy. mltng. steel.	15.50 to 16.00
No. 2 cast	15.00 to 15.50
Stove plate	12.50 to 13.00
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel.	$16.50 to $16.75
No. 2 hvy. mltng. steel.	15.50
Rail (scrap)	16.75
Philadelphia, delivered alongside boats, Port Richmond	
No. 1 hvy. mltng. steel.....	Nominal
No. 2 hvy. mltng. steel.....	Nominal

Construction Steel

. . .STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings jump to 56,500 tons, the highest in more than two years; new projects advance to 27,850 tons from 13,015 tons last week; plate awards call for 1215 tons.

AWARDS

NORTH ATLANTIC STATES

14,000 Tons, Brooklyn, contracts B-18 and 20, elevated highways for Triborough Bridge Authority, to Harris Structural Steel Co., Plainfield, N. J.

11,600 Tons, Rockaway, N. Y., grade elimination for Long Island Railroad, to Bethlehem Steel Co., Bethlehem, Pa., through Charles F. Vachris, Inc.

3240 Tons, Washington, gun assembly shop extension, to Bethlehem Steel Co., Bethlehem, Pa.

2500 Tons, Philadelphia, tremie trusses and wall forms for Navy, to Bethlehem Steel Co., Bethlehem, Pa.

1350 Tons, Edgewood Arsenal, Md., warehouses, to Bethlehem Steel Co., Bethlehem, Pa., through Cummins Construction Co.

900 Tons, Schenectady, N. Y., building for General Electric Co., to Ingalls Iron Works Co., Pittsburgh plant.

480 Tons, McKees Rocks, Pa., warehouse and office building for Federal Enameling & Stamping Co., to Bethlehem Steel Co., Bethlehem, Pa.

450 Tons, Trafford, Pa., printing department building for Westinghouse Electric & Mfg. Co., to Keystone Engineering Co., Pittsburgh.

340 Tons, Palmerton, Pa., extension to furnace building for New Jersey Zinc Co., to Belmont Iron Works, Philadelphia.

310 Tons, Camden, N. J., copper shop for New York Shipbuilding Corp., to Lehigh Structural Steel Co., Allentown, Pa.

270 Tons, Allegheny County, Pa., bridge route 187-395, to Fort Pitt Bridge Works Co., Pittsburgh.

250 Tons, Gardenville, N. Y., State bridge PSC 5998, to Bethlehem Steel Co., Lackawanna, N. Y., through Border Building Co., Buffalo.

230 Tons, Williamsport, Pa., building addition for C. A. Reed Co., to Weatherly Steel Co., Weatherly, Pa.

200 Tons, Webster, Mass., water system shaft, to Greisser & Shlager Iron Works, Somerville, Mass.

135 Tons, Elmira, N. Y., Chemung County jail, to American Bridge Co., Pittsburgh.

125 Tons, Wilmington, Del., platform shelter extensions for Pennsylvania Railroad Co., to Bethlehem Steel Co., Bethlehem, Pa.

120 Tons, Lehigh County, Pa., highway bridge, route 443, to Phoenix Bridge Co., Phoenixville, Pa.

110 Tons, Stanley, N. Y., State bridge PSC-5341, to Genesee Bridge Co., Rochester, N. Y.

100 Tons, Niagara Falls, N. Y., addition to Carborundum Co. plant, to Lackawanna Steel Construction Co., Buffalo.

100 Tons, Buffalo, plant addition for Morrison Steel Products Inc., to R. S. McMannus Steel Construction Co., Buffalo.

100 Tons, Boston Navy Yard, power plant, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

THE SOUTH

4000 Tons, Nashville, Tenn., Vultee Aircraft factory, to Bethlehem Steel Co., Bethlehem, Pa.

520 Tons, Ellis County, Okla., bridge, to Capitol Steel & Iron Co., Oklahoma City.

476 Tons, Louisville, Ky., Reynolds Metals Co. extrusion plant, to International Steel Co., Evansville, Ind.

420 Tons, Pensacola, Fla., engine overhaul building for Navy Department, to Jones & Laughlin Steel Corp., Pittsburgh.

410 Tons, Dow, Tex., Dow Chemical Co. buildings, to Mosher Steel Co., Dallas, Tex.

355 Tons, Pensaco'a, Fla., engine storage building for Naval Air Station, to Southern Steel Works Co., Birmingham.

300 Tons, Clarksburg, W. Va., furnace building for National Carbon Co., to Ingalls Iron Works Co., Pittsburgh plant.

260 Tons, Weston, W. Va., psychiatric unit, State Hospital, to Parkersburg Rig & Reel Co., Parkersburg, W. Va.

240 Tons, Tillman County, Okla., bridge, to J. B. Klein Iron & Foundry Co., Oklahoma City.

200 Tons, Tampa, Fla., plant expansion for Continental Can Co., to Ingalls Iron Works Co., Pittsburgh plant.

CENTRAL STATES

8500 Tons, Dearborn, Mich., aircraft building for Ford Motor Co., to American Bridge Co., Pittsburgh.

510 Tons, Charlestown, Ind., du Pont plant, to American Bridge Co., Pittsburgh.

500 Tons, Gary, Ind., factory addition for Union Drawn Steel Division of Republic Steel Corp., to Joseph T. Ryerson & Son, Inc., Chicago.

460 Tons, Rantoul, Ill., two hangars for Chanute Fie'd, to Bethlehem Steel Corp., Bethlehem, Pa.

350 Tons, Wydmere, N. D., State highway bridge, to Bethlehem Steel Co., Bethlehem, Pa.

300 Tons, Harvey, Ill., Whiting Corp. weld shop, to Wendnagel & Co., Chicago.

260 Tons, Chagrin Falls, Ohio, extension of Fairmount Boulevard for county, to Fort Pitt Bridge Works Co., Cleveland, through Galier Bros., Cleveland.

140 Tons, Huron County, Ohio, State bridge over Huron River, to Bethlehem Steel Co., Bethlehem, Pa., through A. J. Baltes, Norwalk, general contractor.

110 Tons, Chesapeake & Ohio Railroad, floodlight towers in various locations, to International Steel Co., Evansville, Ind.

110 Tons, St. Clair County, Ill., bridge, to Missouri Bridge & Iron Co., St. Louis.

WESTERN STATES

150 Tons, Kettle Falls, Wash., bearing piles for Spokane River bridge piers, to Bethlehem Steel Co., Seattle, through Angeles Gravel & Supply Co., Port Angeles, Wash., contractor.

CANAL ZONE

1000 Tons, Albrook Field, Army construction (CQM-6708-40-117), to United States Steel Export Co., through Fred J. Early, San Francisco, contractor.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

2200 Tons, Brooklyn, Atlantic Avenue subway, Georgia-Schenk Avenues, for Long Island Railroad Co.

1500 Tons, Niagara Falls, N. Y., $1,000,000 plant for Bell Aircraft Corp., Buffalo; Austin Co., Cleveland, general contractor.

500 Tons, Amcelle, Md., manufacturing building for Celanese Corp. of America.

440 Tons, Royalston, Mass., Otter River bridge for Boston & Maine Railroad Co.

350 Tons, Little Compton, R. I., military residence for U. S. Engineers Office.

330 Tons, Quonset Point, R. I., bachelors' quarters for Navy Department.

300 Tons, Quonset Point, R. I., steel wales for Navy Department.

300 Tons, Boston, Massachusetts Memorial Hospital addition.

150 Tons, Wallingsford, Conn., manufacturing plant.

150 Tons, Boston, storage garage for Boston Elevated Railway.

140 Tons, Fairfield, Conn., machine shop for J. L. Lucas & Sons, Inc.

THE SOUTH

850 Tons, Harriman, Tenn., Little Emory bridge for TVA.

800 Tons, Fort Knox, Ky., operations hangar, for War Department.

CENTRAL STATES

7000 Tons, Clayton, Mo., bridge across Mississippi River in St. Louis County; bids in 30 days; Sverdrup & Parcel, St. Louis, engineers.

2000 Tons, Cleveland, warehouse, shipping and enameling buildings for Republic Steel Corp.

1200 Tons, Detroit, assembly and office building for Packard Motor Car Co.

450 Tons, Park Ridge, Ill., Touhy Avenue State underpass.

350 Tons, Chicago, factory and office buildings for Bastian-Blessing Co.

220 Tons, Port Huron, Mich., office building for Detroit Edison Co.

200 Tons, Crete, Neb., State bridge FAGH-98-C (3); bids Oct. 3.

130 Tons, Wyandot County, Ohio, State bridge over Rymochtee Creek.

120 Tons, Madison County, Ohio, State bridge over Deer Creek.

117 Tons, Wyandot County, Ohio, State highway bridge; bids Oct. 4.

110 Tons, Jeffersonville, Ind., central heating plant for War Department.

105 Tons, Toledo, Ohio, platforms and miscellaneous material for Toledo Edison Co.

Weekly Bookings of Construction Steel

Week Ended ——→	Oct. 1, 1940	Sept. 24, 1940	Sept. 3, 1940	Oct. 3, 1939	Year to Date 1940	Year to Date 1939
Fabricated structural steel awards	56,500	42,030	24,810	15,400	802,365	721,875
Fabricated plate awards	1,215	4,545	450	4,325	118,465	121,125
Steel sheet piling awards	22,225	2,170	175	0	60,435	67,880
Reinforcing bar awards	5,250	6,520	7,150	10,200	351,795	359,720
Total Letting of Construction Steel	85,190	55,265	32,585	29,925	1,333,060	1,270,600

103 Tons, Madison and Pickaway Counties, Ohio, State highway project No. 286; bids **Oct. 5.**

100 Tons, Cleveland, rink for Ice Club of Cleveland, Inc.; bids in.

WESTERN STATES

2700 Tons, Anchorage, Alaska, base hangar and two flight hangars at Elmendorf Field (Invitation 36); Bethlehem Steel Co., low bidder.

2600 Tons, Arsenal, Utah, 32 warehouses for Government; bids **Oct. 8.**

1500 Tons. Alameda, Cal., seaplane hangar for Navy.

400 Tons, Orden, Utah, building for Government; bids **Oct. 18.**

125 Tons, Duncan, Ariz., highway work on Duncan-Clifton highway; bids **Oct. 11.**

100 Tons, Seattle, municipal car sheds; bids in.

100 Tons, Frink, Cal., radial gates and hoists for Coachella Canal (Specification 1438-D); bids **Oct. 4.**

100 Tons, Coram, Cal., bulkhead gates, guides, frames, and latches for Shasta power plant (Specification 1436-D); bids **Oct. 3.**

FABRICATED PLATES

AWARDS

850 Tons, Bellingham, Wash., 48-in. pipe, to Steel Tank & Pipe Co. of Oregon, Portland, Ore.

210 Tons, Fort Mifflin, Pa., discharge pipe for U. S. Engineers, to Phoenix Bridge Co., Phoenixville, Pa.

155 Tons, West Port Arthur, Tex., 10 tanks for Gulf Oil Corp., to Petroleum Iron Works Co., Beaumont, Tex.

SHEET PILING

AWARDS

22,000 Tons, Philadelphia and Norfolk Navy Yards, Drydock Associates Corp., material divided about evenly between Carnegie-Illinois Steel Corp., Pittsburgh, and Bethlehem Steel Co., Bethlehem, Pa.

123 Tons, Kansas City, Mo., building, Contractors Machinery Co., to Bethlehem Steel Co., Bethlehem, Pa.

100 Tons, Chagrin Falls, Ohio, Fairmount Boulevard extension, to Carnegie-Illinois Steel Corp., Pittsburgh, through Galier Bros., Cleveland.

Reinforcing Steel

Awards of 5,250 tons; 7,370 tons in new projects

AWARDS

ATLANTIC STATES

550 Tons, Albany County, N. Y., bar mats for highway, to Truscon Steel Co., town, through Arute Bros., Youngstown.

500 Tons, Buffalo, bars for Cargill grain elevator, to an unnamed bidder, through Onstad Inc. of Chicago.

360 Tons, New York, Rapid Transit Railroad, route 110, section 10, to Bethlehem Steel Co., Bethlehem, Pa.

200 Tons, Lehigh County, road work, to Bethlehem Steel Co., Bethlehem, Pa., through C. W. Goode & Co., Lancaster, Pa.

200 Tons, Cranston, R. I., sewerage treatment works, placed privately by J. A. Munroe Sons, North Attleboro, Mass., contractors.

200 Tons, Gloucester, N. J., project for Sherwin-Williams Co. Tonnage allocated between Bethlehem Steel Co., Bethlehem, Pa., and Carnegie-Illinois Steel Corp., Pittsburgh.

180 Tons, Allegheny County, Pa., Route No. 187 project, to Truscon Steel Co., Youngstown, through Laub & Collins.

160 Tons, Pittsburgh, forge plant foundations for Mesta Machine Co., to Bethlehem Steel Co., Bethlehem, Pa., through Booth & Flinn, contractor.

150 Tons, mesh and bars, Falmouth, Mass., encampment improvements, to Concrete Steel Co., Boston.

130 Tons, Harrisburg, Invitation 505-24-31, to Bethlehem Steel Co., Bethlehem, Pa.

110 Tons, Raritan, N. J., mesh for arsenal project, to Truscon Steel Co., Youngstown, through Deakman Wells.

SOUTH AND CENTRAL

600 Tons, Lowrey Field, Ohio, U. S. Army buildings, to Colorado Fuel & Iron Co., Denver, through F. J. Kirckhof, contractor.

240 Tons, Gadsden, Ala., waterworks, to Truscon Steel Co., Youngstown, through V. B. Higgins Co.

200 Tons, Toledo, Ohio, Albertus Brown Homes housing project, to Pollak Steel Co., Cincinnati, through Weinstein Construction Co., contractor.

155 Tons, State of Indiana, highway project R 2025, to Bethlehem Steel Co., Bethlehem, Pa., through Grace Construction & Supply Co.

150 Tons, Lake Toxaway, N. C., project for Nantahala Power & Light Co., to Truscon Steel Co., Youngstown.

150 Tons, Huron County, Ohio, bar mats for State project No. 262, to American Steel & Wire Co., Cleveland, through A. J. Baltes, Norwalk, Ohio.

135 Tons, Natchez, Miss., Federal highway project, to Laclede Steel Co., St. Louis.

130 Tons, Alton, Ill., Bell Telephone building, to Laclede Steel Co., St. Louis.

100 Tons, Wichita, Kan., Cessna Aircraft Co. project, to Sheffield Steel Corp., Kansas City, Mo.

WESTERN STATES

200 Tons, Oleum, Cal., Union Oil Co. list, to Soule Steel Co., San Francisco.

185 Tons, Kettle Falls, Wash., Spokane River bridge piers, to Bethlehem Steel Co., Seattle, through Angeles Gravel & Supply Co., Port Angeles, Wash., contractor.

165 Tons, San Francisco, Alaskan Air Base (Invitation 51), to Gilmore Fabricators, Inc., San Francisco.

100 Tons, Point Arena, Cal., Schooner Gulch bridge, to L. D. Tonn, Lodi, Cal., through Harold Smith, St. Helena, Cal., contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

1500 Tons, Rockaway, N. Y., Long Island Railroad grade elimination, contract No. 5; bids taken.

SOUTH AND CENTRAL

1000 Tons, Center Line, Mich., tank assembly plant, Chrysler Corp.; bids taken.

900 Tons, Cleveland, Outhwaite housing project; new bids **Oct. 10.**

200 Tons, Chicago, factory, Sherwin-Williams Paint Co.

165 Tons, Lake County, Ohio, bar mats for State project No. 285; bids **Oct. 5.**

165 Tons, Cook County, Ill., highway work; bids taken.

160 Tons, Fairland, Okla., bridge, FAP-486-C-1.

160 Tons, Rock Island, Ill., housing project.

120 Tons, Sioux Falls, S. D., Morrell Packing Co. plant.

115 Tons, Beloit, Wis., Fairbanks, Morse & Co. plant.

110 Tons, Rock Island, Ill., housing project; bids taken.

105 Tons, Caro, Mich., bridge FBI of 79-13-5-C1.

100 Tons, Greenup County, Ky., highway project, FAS-292-D (1); bids **Oct. 4.**

WESTERN STATES

1300 Tons, Vallejo, Cal., Navy housing project; bids in.

975 Tons, Oakland, Cal., two Navy storehouses (Specification 10,034); N. P. Severin Co., Chicago, low bidder on general contract.

170 Tons, Duncan, Ariz., highway work on Duncan-Clifton highway; bids **Oct. 11.**

125 Tons, Hickam Field, Hawaii, hangar (Invitation QM-6812-41-14); bids in.

Cast Iron Pipe

Metropolitan District Commission, Hartford, Conn., has taken under advisement bids on 448 tons of 6, 8 and 12-in. class 150 pipe and 18 tons of class D unlined and cement lined special castings.

Army Department, through a contractor, this week will purchase 76,000 ft. of 6 to 12-in. pipe for its encampment at Falmouth, Mass.

Newburv, Mass., is investigating a proposed water system requiring about five miles of cast iron pipe. Whitman & Howard, 89 Broad Street, Boston, are engineers.

Pineville, N. C., asks bids until Oct. 7 for 16, 12, 8, 6 and 2-in. pipe for water system; also cast iron specials, gate valves, 75,000-gal. elevated steel tank on 75-ft. tower, water-softening equipment and other waterworks installation.

Knoxville, Iowa, closes bids Oct. 23 (postponed from Oct. 8) for 32,500 ft. of 12-in. pipe for main water transmission line; also for fittings, venturi meter and meter chamber, and concrete reservoir. Bond issue of $140,000 has been arranged. Foth & Boyd, 310 Pine Street, Green Bay, Wis., are consulting engineers.

Black Creek, Wis., asks bids until Oct. 11 for cast iron pipe and fittings for water system (Contract 3); hydrants and valves (Contract 4), and elevated steel tank and tower (Contract 6). A. E. McMahon Engineering Co., Menasha, Wis., is consulting engineer.

General Purchasing Officer, Panama Canal, Washington, asks bids until Oct. 8 for 4400 ft. of cement-lined cast iron water pipe, cement-lined cast iron pipe fittings, cement-lined cast iron flanged pipe fittings, check valves, gaskets, etc. (Schedule 4385).

Dickinson, Tex., plans pipe lines for new water control and improvement district; also pumping station and other waterworks installation. Cost about $57,000, of which $25,000 will be a bond issue, recently voted, and remainder secured through Federal aid.

Osgood, Ind., plans about two miles of pipe for water system; also pumping plant and other waterworks installation. Cost about $79,000. Lewis S. Finch, Century Building, Indianapolis, is consulting engineer.

Rolla, N. D., plans pipe lines for water system in Districts Nos. 4 and 5, including main supply line.

Mocksville, N. C., plans pipe lines for water system and other waterworks installation. Fund of about $60,000 is being arranged for this and sewage system, of which about $40,000 will represent a bond issue, to be voted soon, and remainder secured through Federal aid. W. F. Freeman, High Point, N. C., is consulting engineer.

San Francisco has awarded 191 tons of 8-in. pipe to Central Foundry Co., Oakland, Cal. (Invitation 2489).

Pipe Lines

Stanolind Pipe Line Co., Tulsa, Okla., a subsidiary of Stanolind Oil & Gas Co., same address, plans welded steel pipe line from oil field in Shelby County, Ill., to connection with main pipe line system from Wyoming, for crude oil transmission. Cost over $85,000.

Picayune, Miss., asks bids until Oct. 7 for pressure pipe line system for natural gas distribution, including main welded steel pipe line for connection with supply source, control station and other operating facilities. Bids received on recent call have been rejected. S. Logan McConnell, 1333 Webster Street, New Orleans, is consulting engineer.

City Water Department, Tacoma, Wash., W. A. Kunigk, superintendent, plans about 762 ft. of 48-in. steel pipe for new by-pass line from water reservoir on Hood Street; also about 20,925 ft. of 58-in. and 9426 ft. of 52-in. steel pipe for new main line from Green River. Latter work is scheduled to be carried out early in 1941. Concrete pipe will be considered as an alternate for all lines noted.

City Gas Co., Nocona, Tex., plans 6 or 8-in. pressure pipe line from new gas recycling plant to point in municipality in immediate vicinity. Cost over $50,000.

Alabama Gas Co., Montgomery, Ala., has let contract to B. & M. Construction Co., Petroleum Building, Oklahoma City, Okla., for welded steel pipe line from connection with present system at Selma, Ala., to Air Corps training school in that vicinity, for natural gas transmission service at latter place. Cost over $50,000.

East Ohio Gas Co., 1405 East Sixth Street, Cleveland, plans steel pipe lines in connection with development of natural gas properties in gas field in Ashtabula County, including pipe line gathering system. Also will install booster station and other facilities.

Socony-Vacuum Oil Co., Inc., 26 Broadway, New York, has work under way on new welded steel pipe line from Buffalo to Syracuse, N. Y., by way of Rochester, N. Y., for gasoline transmission from company Atlas refinery at Buffalo to terminals in last two noted cities. Cost about $750,000.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes[2]	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE Standard cokes (Per 100-lb. base box)	$5.00	$5.00	$5.00						$5.10						
BLACK PLATE 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (10)			
TERNES, M'FG. Special coated (Per base box)	$4.30		$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢					2.40¢	2.70¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail)[7]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢				2.40¢	2.45¢	2.15¢		
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢							2.70¢		
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Coatesville and Claymont = 2.10¢)		2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)										
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Spring	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)								
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢					2.85¢	2.95¢			
IRON BARS															
Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to 29 gage within certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lots to manufacturing trade. [10] Boxed.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the making of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 4/64 in., $3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	56
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and smaller by 6 in. and shorter	68
9/16 and ⅝ in. by 6 in. and shorter	66
¾ to 1 in. by 6 in. and shorter	64
1⅛ in. and larger, all lengths	62
All diameters over 6 in. long	62
Lag, all sizes	65
Plow bolts	68½
Hot pressed nuts; c.p.c., t-nuts; square, hex., blank or tapped:	
½ in. and smaller	66
9/16 in. to 1 in. inclusive	66
1⅛ in. to 1½ inclusive	61
1⅝ in. and larger	60

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
½ in. and smaller	66	70
9/16 to 1 in.	63	65
1⅛ in. through 1½ in.	61	62
1⅝ in. and larger	60	..

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	72½ and 10
Stove bolts in packages, with nuts attached	72½
Stove bolts in bulk	82

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York, lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.40

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 10

Cap and Set Screws

	Per Cent Off List
Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled headless set screws, cut thread ¼ in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70
Upset set screws, cup and oval points	75
Milled studs	52

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Sept. 25	Sept. 26	Sept. 27	Sept. 28	Sept. 30	Oct. 1
Copper, Electrolytic[1]	12.00	12.00	12.00	12.00	12.00	12.00
Copper Lake	12.00	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York	50.25	50.50	51.50	....	51.50	51.50
Zinc, East St. Louis[2]	7.25	7.25	7.25	7.25	7.25	7.25
Lead, St. Louis[3]	4.85	4.85	4.85	4.85	4.85	4.85

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

	New York	Cleveland
Tin		
Straits pig	53.75	54.50
Copper		
Electro	12.75	13.125
Castings	12.50	12.875
H. R. Sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow, sheets*	18.65	18.65
Yellow, rods*	13.67	13.67
Seamless tubes*	21.40	21.40
Zinc		
Slabs	8.75	8.10
Sheets, No. 9 casks	12.50	14.00
Lead		
American pig	6.00	5.50
Bar	7.95	8.25
Cut sheets	8.15	8.25
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt., 98-99%	18.00	18.50
Solder		
½ and ½	31.75	32.25
Babbitt		
Anti-friction grade	23.50	21.75

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy. crucible	9.625	10.25
Hvy. and wire	8.625	9.025
Light and bottoms	7.625	8.125
Brass		
Heavy	5.375	5.880
Light	4.375	5.125
No. 1 yel. turn.	5.00	6.00
No. 1 red or compo. turnings	7.80	8.50
Hvy. Mach. compo.	8.25	8.875
Lead		
Heavy	4.125	4.50
Aluminum		
Cast	8.50	9.50
Sheet	13.00	14.00
Zinc	4.375	5.125

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 18c.-19c. a lb.; No. 12 remelt No. 2 standard, 18c.-19c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $173-175 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 12.25c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....$54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade	2.70c.
Delivered, Detroit	2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	$0.35
2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.70
2500 (5 Ni)	2.55
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.70
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.20
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20
6100 Cr-V spring steel	0.85
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c., carlots.

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H't strip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st..	22.00c.	22.50c.	32.00c.	52.00c.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

MILLIONS
OF Bronze Bearings
Await Your Call

● You can avoid costly, irritating delays when purchasing bronze bearings. Simply specify "JOHNSON GENERAL PURPOSE"—and your order will be shipped the same day it is received. Vast stores of over 800 individual sizes are maintained in every principal industrial center. Every bearing is the highest quality possible . . . machine finished to standard tolerance for immediate assembly.

JOHNSON GENERAL PURPOSE BEARINGS will cut your maintenance costs. Cast in S.A.E. 64—Copper 80%; Tin 10%; Lead 10%—they deliver unexcelled performance and long bearing life. For SERVICE and ECONOMY—try Johnson Bearings on your next job.

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76 Pages—fully illustrated—lists and describes the most complete sleeve bearing service in the world. Write for your free copy Today.

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Sleeve BEARING HEADQUARTERS
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BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall.

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Dawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
1 in. o.d.13 B.W.G.	$9.01	$7.82	....
1¼ in. o.d.13 B.W.G.	10.67	9.26	....
1½ in. o.d.13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d.13 B.W.G.	13.42	11.64	11.06
2 in. o.d.13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d.13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d.12 B.W.G.	18.45	16.01	15.16
2½ in. o.d.12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d.12 B.W.G.	21.42	18.59	17.54
3 in. o.d.12 B.W.G.	22.48	19.50	18.35
3½ in. o.d.11 B.W.G.	28.37	24.62	23.15
4 in. o.d.10 B.W.G.	35.20	30.54	28.66
4½ in. o.d.10 B.W.G.	43.04	37.35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extas for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20.000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price=$200 Per Net Ton

Butt Weld

Steel	Black	Galv.
⅛ in.	56	86
¼ to ⅜ in.	59	43½
½ in.	63½	54
¾ in.	66½	58
1 to 3 in.	68½	60½

Wrought Iron	Black	Galv.
¼ and ⅜ in.	+9	+10
½ in.	24	6½
¾ in.	30	13
1 and 1¼ in.	34	19
1½ in.	38	21½
2 in.	37½	21

Lap Weld

Steel		
2 in.	61	52½
2½ and 3 in.	64	55½
3½ to 6 in.	66	57¼
7 and 8 in.	65	55½
9 and 10 in.	64½	55
11 and 12 in.	63½	54

Wrought Iron		
2 in.	30½	15
2½ to 3½ in.	31½	17½
4 in.	33½	21
4½ to 8 in.	32½	20
9 to 12 in.	28½	15

Butt weld, extra strong, plain ends

Steel	Black	Galv.
⅛ in.	54½	41½
¼ to ⅜ in.	56½	45½
½ in.	61½	53½
¾ in.	65½	57½
1 to 3 in.	67	60

Wrought Iron		
¼ and ⅜ in.	+10	+43
½ in.	25	9
¾ in.	31	15
1 to 2 in.	38	22½

Lap weld, extra strong, plain ends

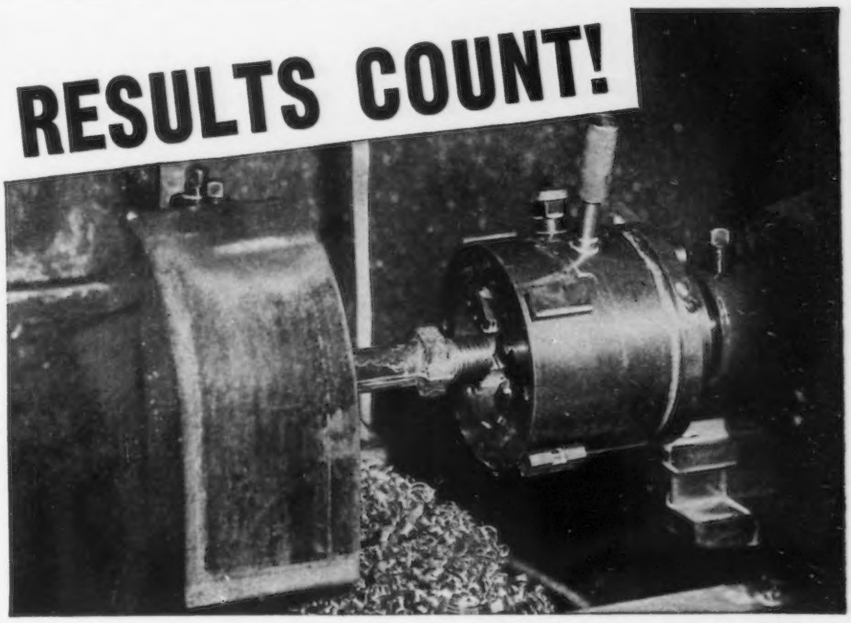
Steel		
2 in.	59	51½
2½ and 3 in.	63	55½
3½ to 6 in.	66½	59
7 and 8 in.	65½	56
9 and 10 in.	64½	55
11 and 12 in.	63½	54

Wrought Iron		
2 in.	33½	18½
2½ to 4 in.	39	25½
4½ to 6 in.	37½	24
7 and 8 in.	38½	24½
9 to 12 in.	32	20½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

RESULTS COUNT!



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This is but one of many examples where Cities Service Metal Cutting Lubricants have justified the title, "Service Proved." We will welcome an opportunity to tell you more about them and about our Lubrication Engineers' Service. Just fill out the coupon below and mail it for further information.

Copies of our booklet, "Metal Cutting Lubrication" are still available to users of metal cutting lubricants. Write for your copy today before the supply is exhausted.

*Name furnished on request.

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ORES

Lake Superior Ores

Delivered Lower Lake Ports

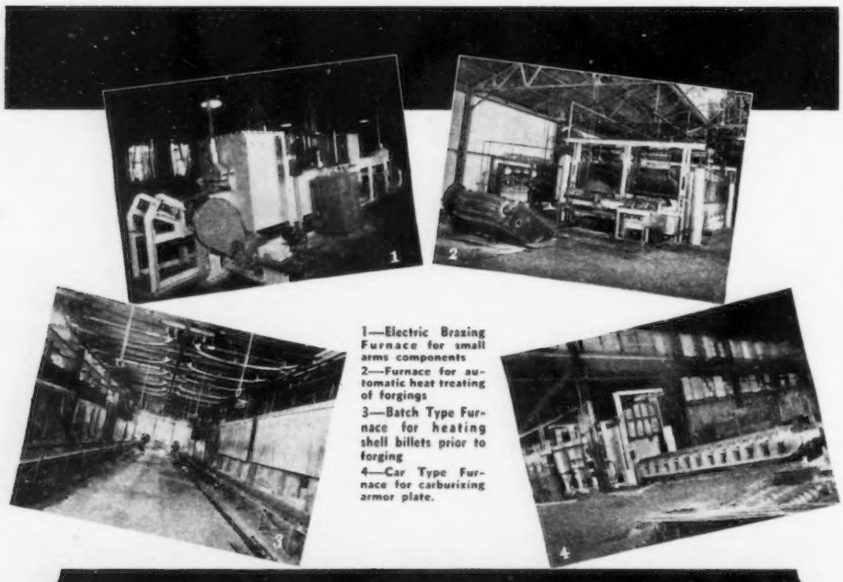
	Per Gross Ton
Old range, bassemer, 51.50%..	$4.75
Old range, non-bessemer,51.50%	4.60
Mesaba, bessemer, 51.50%....	4.60
Mesaba, non-bessemer, 51.50%.	4.45
High phosphorus, 51.50%.....	4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty

	Per Unit
Algerian, low P, Cu free, dry, 55 to 58% Fe	12c.
Caucasian, washed, 52% Mn	60c.
African, Indian, 44 to 48% Mn	51c.
African, Indian, 49 to 51% Mn	56c.
Brazilian, 46 to 48% Mn	53c.
Cuban, del'd, duty free, 51% Mn	72c.

	Per Short Ton Unit
Tungsten, Chinese, Wolframite, duty paid, delivered	Nom.
Tungsten, domestic scheelite, delivered	Nom.
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	Nom.
Rhodesian, 45%	$23.50
Rhodesian, 48%	27.50


1—Electric Brazing Furnace for small arms components
2—Furnace for automatic heat treating of forgings
3—Batch Type Furnace for heating shell billets prior to forging
4—Car Type Furnace for carburizing armor plate.

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And Special Forging Plants

5—Rotary Hearth Furnace for heating shell billets prior to forging
6—Furnace for heating aluminum billets for rolling and extrusion
7—Furnace for annealing aluminum plates and sheets for aircraft industries
8—Acetylene cutting tables for cutting billets for forgings
All equipment designed for ready adaptation to peacetime production.

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SALEM ENGINEERING COMPANY

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton	$40.00
Angle bars, 100 lb.	2.70

F.o.b. Basing Points

Light rails (from billets), gross ton	$40.00
Light rails (from rail steel), gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts, steam railroads	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR *Per Net Ton*

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail	$19.00 to $20.00
Domestic, f.o.b. Ohio River landing barges	19.00 to 20.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines	19.00 to 20.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid	Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.00
As above, in bags, f.o.b. same mines	32.60

REFRACTORIES

Fire Clay Brick	*Per 1000 f.o.b. Works*
Super-duty brick, at St. Louis	$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1 Ohio	39.90
Ground fire clay, per ton	7.10
Silica Brick	
Pennsylvania	$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement, net ton (Eastern)	8.55
Chrome Brick	*Net per Ton*
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	50.00
Magnesite Brick	
Standard f.o.b. Baltimore and Chester	$72.00
Chemically Bonded, f.o.b. Baltimore	61.00
Grain Magnesite	
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	$40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) $120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21% $36.00
Domestic, 26 to 28% 49.50

Electric Ferrosilicon

Per Gross Ton, Delivered, Lump Size

50% (carload lots, bulk) $74.50*
50% (ton lots, packed) 87.00*
75% (carload lots, bulk) 135.00*
75% (ton lots, packed) 151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50% $33.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50% $27.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon ..... 11.00c.
2% carbon ..... 17.50c.
1% carbon ..... 18.50c.
0.10% carbon ..... 20.50c.
0.06% carbon ..... 21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon $113.00*
2.50% carbon 118.00*
2% carbon 123.00*
1% carbon 133.00*

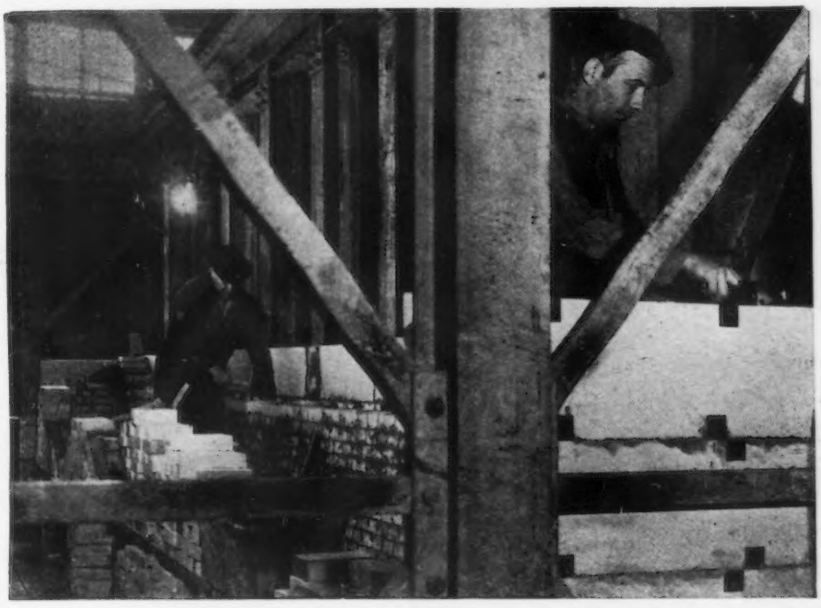
Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload $2.00
Ferrotungsten, 100 lb. and less 2.25
Ferrovanadium, contract, per lb. contained V., del'd $2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots ..... $2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace, carload and contract, per net ton $142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton $157.50
Ferrophosphorus, electric or blast furnace material, in carloads, fo.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton 58.50
Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross tons, $3 unitage, freight equalized with Nashville 75.00
Ferromolybdenum, per lb. Mo, f.o.b. furnace ..... 95c.
Calcium molybdate, per lb. Mo, f.o.b. furnace ..... 80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J. ..... 4.10c.
No. 6, f.o.b. Bayonne, N. J. ..... 2.98c.
No. 5 Bur. Stds., del'd Chicago 3.25c.
No. 6 Bur. Stds., del'd Chicago .. 2.75c.
No. 3 distillate, del'd Cleveland . 5.25c.
No. 4 industrial, del'd Cleveland . 5.00c.
No. 5 industrial, del'd Cleveland . 3.75c.
No. 6 industrial, del'd Cleveland . 3.25c.



Therm-O-flake
B B INSULATING BLOCK

SUPERIOR HIGH TEMPERATURE INSULATION

Has smooth, perfectly plane surfaces that make tight-fitting joints.

Provides extra efficient insulation over a wide temperature range.

Widely used in steel plated furnace walls and is quite water resistant.

Extra strong, sharp edges and corners insures minimum loss thru breakage.

Supplied in all standard block sizes and lagging, also in a wide variety of tailor made special shapes.

●

Write for Information and Prices

Other **Therm-O-flake** Products

Made from Exfoliated Vermiculite

Granules - Brick - Block - Concrete

Illinois Clay Products Company

JOLIET, ILL.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt ..... $4.50 to $4.75

Foundry, f.o.b. Connellsville, prompt ..... $5.25 to 5.50

F'dry, by-product, Chicago 10.50

F'dry, by-product, New England 12.50

Foundry, by-product, Newark or Jersey City ..... $11.30 to $11.90

F'dry, by-product, Philadelphia 11.13

F'dry, by-product, Cleveland ... 11.05

F'dry, by-product, Cincinnati .. 10.50

Foundry, Birmingham 7.50

F'dry, by-product, St. Louis $10.75 to $11.00

Foundry, from Birmingham, f.o.b. cars dock Pacific ports $14.75

BRITISH

British

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export. £17 18s.

Tin plate, per base box. 32s. to 33s.

Steel bars, open hearth £13 9s.

Beams, open hearth .... £12 2s. 6d.

Channels, open hearth .. £12 2s. 6d.

Angles, open hearth .... £12 2s. 6d.

Black sheets, No. 24, gage £18 17s. 6d. max.*; £18 17s. 6d. min.**

Galvanized sheets, No. 24 gage £19 10s. max.*; £19 10s. min.**

*Empire markets only.
**Other than Empire markets.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	***$24.50***	***$24.00***	***$25.50***	***$25.00***	.....
Brooklyn	***26.50***	.....	.....	***27.00***	.....
Jersey City	***25.53***	***25.03***	***26.53***	***26.03***	.....
Philadelphia	***24.84***	***24.34***	***25.84***	***25.34***	.....
Bethlehem, Pa.	$24.00	$23.50	$25.00	$24.50	.....
Everett, Mass.	24.00	23.50	25.00	24.50	.....
Swedeland, Pa.	24.00	23.50	25.00	24.50	.....
Steelton, Pa.	.....	23.50	.....	.....	28.50
Birdsboro, Pa.	24.00	23.50	25.00	24.50	28.50
Sparrows Point, Md.	24.00	23.50	.....	.....	.....
Erie, Pa.	23.00	22.50	24.00	23.50	.....
Neville Island, Pa.	23.00	22.50	23.50	23.00	.....
Sharpsville, Pa.	23.00	22.50	23.50	23.00	.....
Buffalo	23.00	22.00	24.00	23.50	28.50
Cincinnati	***23.44***	***23.61***	.....	***24.11***	.....
Canton, Ohio	***24.39***	***23.89***	***24.89***	***24.39***	.....
Mansfield, Ohio	***24.94***	***24.44***	***25.44***	***24.94***	.....
St. Louis	***23.50***	***23.02***	.....	.....	.....
Chicago	23.00	22.50	23.50	23.00	.....
Granite City, Ill.	23.00	22.50	23.50	23.00	.....
Cleveland	23.00	22.50	23.50	23.00	.....
Hamilton, Ohio	23.00	22.50	.....	23.00	.....
Toledo	23.00	22.50	23.50	23.00	.....
Youngstown	23.00	22.50	23.50	23.00	.....
Detroit	23.00	22.50	23.50	23.00	.....
St. Paul	***25.63***	.....	***26.13***	***25.63***	.....
Duluth	23.50	.....	24.00	23.50	.....
Birmingham	19.38*	18.00	24.00	.....	.....
Los Angeles, San Francisco and Seattle	***27.50***	.....	.....	.....	.....
Provo, Utah	22.00	.....	.....	.....	.....
Montreal†	27.50	27.50	.....	28.00	.....
Toronto†	25.50	25.50	.....	26.00	.....

GRAY FORGE

Valley or Pittsburgh fce. $22.50

CHARCOAL

Lake Superior fce. $27.00
Delivered Chicago 30.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

*Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

WAREHOUSE PRICES

(Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas)

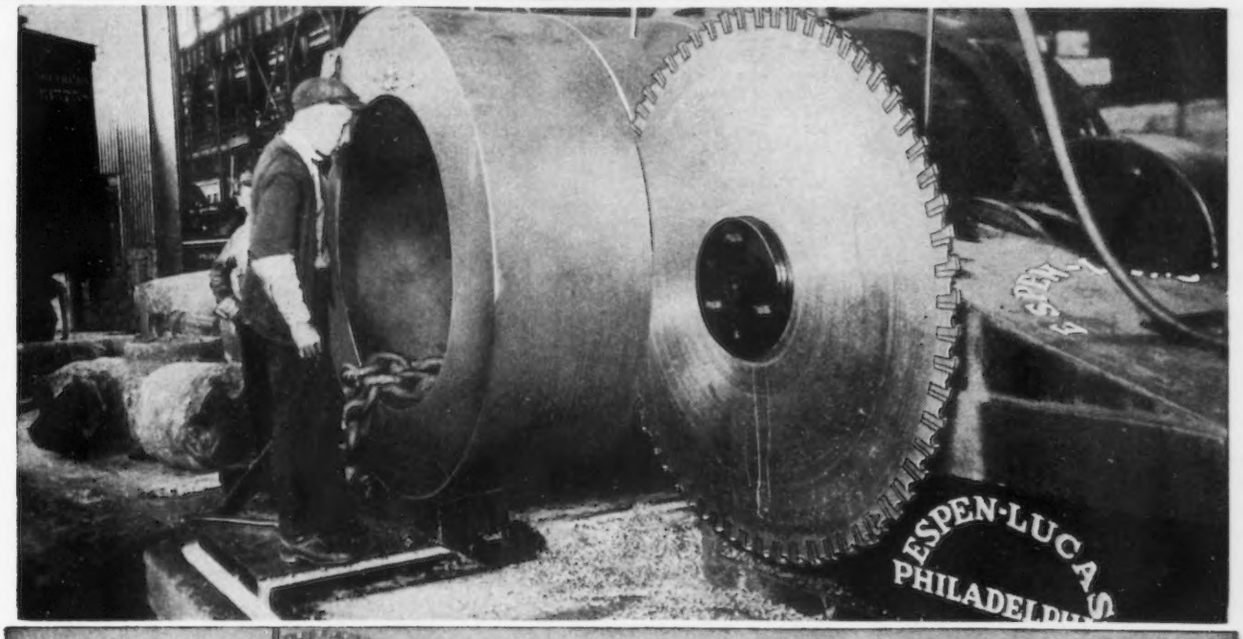
	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.15	$3.05	$3.15	$3.35	$3.38	$3.23	$3.05	$3.51	$3.45	$3.18	$3.30	$3.48	$4.30
Sheets, cold rolled	....	4.10	4.05	4.05	4.40	4.30	4.30	4.58	....	4.12	4.35	4.43	6.50
Sheets, galvanized	4.75	4.60	4.42	4.50	4.30	4.64	4.00	4.66	4.75	4.95	4.75	4.98	5.25
Strip, hot rolled	3.40	3.40	3.30	3.75	3.76	3.48*	3.62	3.86	3.70	3.52	3.65	3.73	....
Strip, cold rolled	3.20	3.30	3.20	3.31	3.31	3.20	3.22	3.26	....	3.41	3.83	3.54	....
Plates	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.35	3.47	3.80	3.68	4.00
Structural shapes	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.55	3.47	3.80	3.68	4.00
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.62	3.75	3.63	4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.20	7.10	7.30	7.31	7.35	7.42	7.10	7.50	....	7.47	7.45	7.33	9.40
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	8.55
Bars, cd. drn. SAE 2300	8.15	8.15	8.15	8.56	8.59	8.45	8.15	8.63	....	8.52	8.84	8.38	10.65
Bars, cd. drn. SAE 3100	6.75	6.75	6.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	9.80

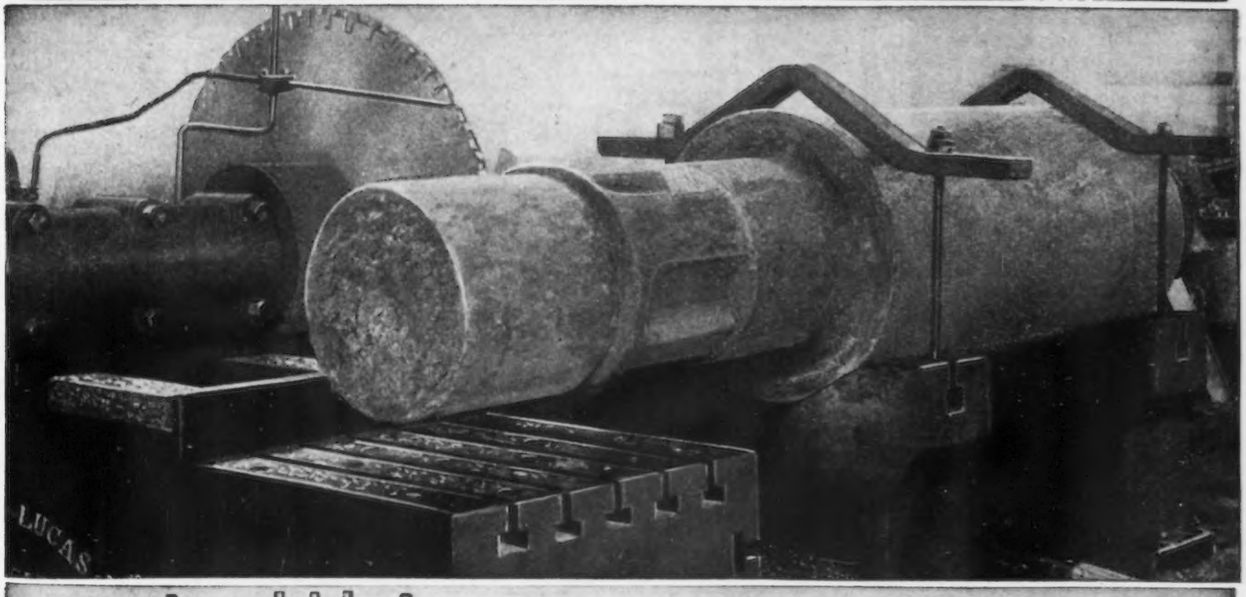
BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 150 to 499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 150 to 1049 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.23.

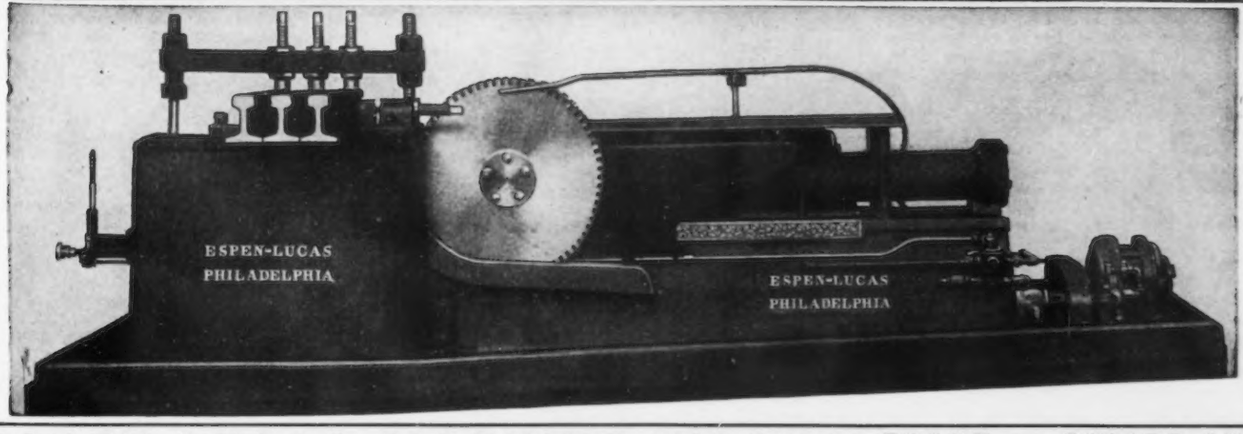
Cold Sawing Machines

All SIZES KINDS

FOR BIG WORK







ESPEN-LUCAS MACHINE WORKS

FRONT AND GIRARD AVE.
PHILADELPHIA, PA.

Sales Possibilities

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic

● **American Brake Shoe & Foundry Co.,** 230 Park Avenue, New York, has asked bids on general contract for one and two-story addition, 66 x 116 ft., to American Forge Division plant, Chicago, and improvements in present works. Cost over $85,000 with equipment. Benjamin F. Olson, 19 South LaSalle Street, Chicago, is architect.

Babcock & Wilcox Co., 85 Liberty Street, New York, watertube boilers, boiler tubes, etc., has purchased former plant of A. G. Reeves Co., Alliance, Ohio, manufacturer of kindred products, and will remodel for branch works, with facilities for employment of about 300 men.

Purchasing and Contracting Officer, Medical Section, New York General Depot, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until Oct. 9 for seamless steel cylinders (Circular 603-41-56).

Universal Atlas Cement Co., 135 East Forty-second Street, New York, has let general contract to Rust Engineering Co., Clark Building, Pittsburgh, for one and multi-story addition to branch mill at Hudson, N. Y. Cost close to $125,000 with equipment.

Pennsylvania Mfg. Co., 810 Pennsylvania Avenue, Brooklyn, metal pocketbook frames and kindred metal specialities, has purchased six-story building, 100 x 100 ft., at 245 Glenmore Avenue, about 60,000 sq. ft. floor space, for new plant and will remove to new location, increasing capacity.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 8 for 91,200 ft. of bronze steam hose (Schedule 3237) for Brooklyn and Mare Island Navy yards; 175 hand-driven testing generators and 60 magneto hand-ringer testing generators (Schedule 3228) for same yards; 165,000 non-watertight attachment plugs (Schedule 3229) for Brooklyn, Sewalls Point, Va., and San Diego yards.

Magnetic Pigment Co., 41 East Forty-second Street, New York, manufacturer of iron oxide and allied products, has let general contract to Newton A. K. Bugbee Co., 206 East Hanover Street, Trenton, N. J., for four-story addition, 40 x 110 ft., to plant on Cass Street, Trenton. Cost close to $100,000 with equipment.

R. Hoe & Co., Inc., 910 East 138th Street, New York, printing press machinery and parts, saws, etc., has approved plans for one-story steel fabricating shop at 220 Locust Avenue, Bronx. Cost close to $40,000 with equipment. Frederick J. Woodbridge, 101 Park Avenue, is architect.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until Oct. 10 for two lots of wire, each lot 52,800,000 to 211,200,000 ft. (Circular 150), reels in lots of 66,000 to 88,000, and 30,000 to 40,000, respectively (Circular 161).

Bethlehem Steel Co., Shipbuilding Division, 25 Broadway, New York, and Bethlehem, Pa., plans three-story shop at shipyard, Staten Island, for pipe and copper shops, machine shop, and mold loft. Cost about $400,000 with equipment. Structure will be built with Federal funds and Navy Department will hold title.

Wright Aeronautical Corp., 32 Beckwith Avenue, Paterson, N. J., airplane engines and parts, has approved plans for one-story addition to plant No. 1 for expansion in assembling division, and one-story addition to plant No. 3, Fairlawn, near Paterson, for production of magnesium engine castings. Both structures will total about 250,000 sq. ft. floor space. Cost close to $1,000,000 with equipment.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until Oct. 7 for brass forgings (Circular 756), centrifugal pump (Circular 764), steel music wire (Circular 767).

Federal Shipbuilding & Drydock Co., Kearny, N. J., has let general contract to Walter Kidde Constructors, Inc., 140 Cedar Street, New York, for multi-story storage and distributing building. Cost about $750,000 with mechanical-handling and other equipment. This is part of expansion to cost over $1,300,000 with equipment, including one-story pipe shop, 140 x 380 ft., for which contract recently was let to Austin Co., Cleveland, to cost about $350,000 with equipment.

American Aniline Products, Inc., 50 Union Square, New York, chemicals, dyes, etc., has approved plans for one-story additions to plant at Lock Haven, Pa. Cost about $250,000 with equipment.

Edward G. Budd Mfg. Co., Twenty-fifth Street and Hunting Park Avenue, Philadelphia, steel automobile bodies, etc., has acquired plant at Roberts Avenue and Fox Street for expansion.

Buffalo District

● **Marlin-Rockwell Corp.,** Chandler Street, Jamestown, N. Y., ball bearings, etc., has let general contract to J. M. Benzinger Construction Co., Jamestown, for one-story addition, about 37,000 sq. ft. floor space. Cost close to $85,000 with equipment.

Central New York Power Corp., Syracuse, N. Y., is arranging bond issue of $5,000,000, majority of proceeds to be used for expansion and improvements in plants and system.

Carborundum Co., Niagara Falls, N. Y., has let general contract to Wright & Kremers, Inc., Main and Pine Streets, for two-story addition, 78 x 216 ft., for expansion in furnace department and other divisions. Cost over $80,000 with equipment.

New England

● **Stamford Rolling Mills, Inc.,** Springdale, Conn., brass, bronze and other metal products, has let general contract to F. D. Rich Co., Inc., 270 Atlantic Street, Stamford, Conn., for one-story addition, 232 x 274 ft., with office unit adjoining, 72 x 273 ft. Cost over $150,000 with equipment. Fletcher-Thompson, Inc., 1336 Fairfield Avenue, Bridgeport, Conn., is architect and engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 8 for 10 motor-driven, combination contour metal sawing, filing and polishing machines for Portsmouth, N. H., South Boston, Mass., Brooklyn, Norfolk, Mare Island and Puget Sound Navy yards (Schedule 3273).

Gavaert Co. of America, Inc., 182 Cole Avenue, Williamstown, Mass., processed paper stock, films, etc., has let general contract to Petricca Construction Co., 203 Pomeroy Avenue, Pittsfield, Mass., for three-story and basement mill addition, 61 x 92 ft. Cost over $75,000 with equipment.

Warren Telechron Co., Ashland, Mass., electric clocks and parts, has let general contract to J. W. Bishop Co., 109 Foster Street, Worcester, Mass., for three-story addition, 120 x 180 ft., and extension in steam power plant. Cost about $200,000 with equipment.

Washington District

● **Bureau of Yards and Docks,** Navy Department, Washington, asks bids (no closing date stated) for diesel-electric traveling revolving jib cranes for dry docks at Brooklyn Navy Yard, and Hunters Pont, Cal.; and for gasoline-electric traveling hammerhead cranes for Brooklyn, Philadelphia and South Boston yards (Specification 10086).

Bethlehem Steel Co., Shipbuilding Division, Key Highway, Baltimore, has let general contract to Consolidated Engineering Co., 20 East Franklin Street, for one-story addition to metal-working shop, two-story addition to woodworking shop, 100 x 180 ft., and other shop structures; 300 ft. extension to pier No. 7, new wet basin, 180 x 500 ft., and other improvements. Installation will include heavy-duty cranes and other mechanical-handling equipment. Entire project to cost over $2,500,000.

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until Oct. 7 for air-conditioning equipment (Circular 383) portable mixers (Circular 384), steel shipping containers (Circular 382), electric furnace (Circular 389); until Oct. 10, steel wire cloth (Circular 394).

Seaboard Airline Railway Co., Norfolk, Va., has asked bids on general contract for one-story shop and boiler house at construction shops, Atlanta, Ga. Cost over $70,000 with equipment.

Baltimore & Ohio Railroad Co., Baltimore, has approved plans for diesel oil storage and pumping stations for engine fuel at Wells Street and Key Highway, South Smallwood and Pulaski Streets, 901 South Eutaw Avenue, Fort Avenue and Street, and near Orange Farms, each unit to comprise two steel storage tanks, each about 8000 gal. capacity, with pumping plant, sand bin and other structures.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 8 for stockless steel anchors (Schedule 3251) for Camden, N. J., Sewalls Point, Va., Cleveland and Lorain, Ohio, Portland, Ore., Alameda, Cal., and other yards; until Oct. 11, three 4000-lb. low-lift, electric platform trucks; three 5000-lb. telescoping, high-lift, electric trucks; four electric tilting, tiering, telescoping fork-type trucks, and two 6000-lb. electric trucks, heavy-duty crane, telescopic boom, all with storage batteries (Schedule 3292) for New York, Jacksonville, Fla., Corpus, Christi, Tex., and other yards.

South Atlantic

● **St. Marys Kraft Corp.,** St. Marys, Ga., an interest of Gilman Paper Co., Gilman, Vt., Charles Gilman, vice-president, recently organized, has let general contract to Morton C. Tuttle Co., Park Square Building, Boston, for new pulp mill on 80-acre tract near St. Marys, with power house, pumping station, machine shop and other mechanical units. Cost close to $2,000,000, instead of smaller sum, previously noted. George F. Hardy, 305 Broadway, New York, is consulting engineer.

Carolina Truck & Trailer Co., 2237 Dowd Road, Charlotte, N. C., has let general contract to G. T. Barnes, 1830 Asheville Place, for one-story plant on North Tryon Street, for trailer production, including parts manufacture and assembling. Cost close to $50,000 with equipment.

South Central

● **Dixie Steel Mfg. Co.,** a subsidiary of Tulsa Boiler & Machinery Co., Inc., Union Street, Tulsa, Okla., has acquired tract on Railroad Avenue, Memphis, Tenn., for new one-story plant for production of steel tanks for oil and other storage. Cost close to $60,000 with equipment.

United States Engineer Office, Louisville, asks bids until Oct. 14 for equipment and templates for production of recess grating and framing for locks 43-45 and 49-53, Ohio River; and for walkway grating and hand railing for locks 43 and 44, Ohio River.

Nashville Municipal Airport, Nashville, Tenn., plans steel hangar with shop and reconditioning facilities, to be used by 105th Observation Squadron, Tennessee National Guard. Cost about $90,000 with equipment. Financing is being arranged through Federal aid.

FROM TOM-TOM TO TELETYPE

In African jungles, messages are often transmitted by talking drums—a method that is slow and limited to the distance an ear can hear.

In American business, messages are transmitted by "talking" type—a method that carries written words any distance as *quickly as they're typed!*

Many businesses benefit by the up-to-the-minute efficiency of typing-by-wire. It helps speed orders to waiting customers . . . flashes specifications accurately to far-off factories . . . records stock transactions as they're discussed between distant points . . . saves time, mistakes and money in many other ways.

A Bell System representative will be glad to tell you about this modern communication method. Call him through your local telephone office.

BELL SYSTEM
TELETYPEWRITER SERVICE

Latonia Refining Co., Latonia, Ky., has let general contract to Dravo Corp., Neville Island, Pittsburgh, for expansion and improvements in oil refinery, including new buildings, three pumping plants and other facilities. Cost about $100,000 with equipment.

Southwest

• **Cessna Aircraft Corp.**, Wichita, Kan., airplanes and parts, has let general contract to Walter Armagost, Kauffman Building, for one-story addition, 150 x 400 ft., for expansion in parts and assembling departments. Cost over $100,000 with equipment.

Wabash Railway Co., Railway Exchange Building, St. Louis, plans addition to engine house and repair shop, 52 x 170 ft., at Moberly, Mo. Cost over $75,000 with equipment.

Security Stove & Mfg. Co., 1630 Oakland Avenue, Kansas City, Mo., stoves and ranges, oil-fired furnaces, etc., plans two one-story additions, for foundry and assembling service. Cost over $65,000 with equipment.

Consolidated Steel Corp., Ltd., 5700 South Eastern Avenue, Los Angeles, has awarded contract to Bechtel-McCone-Parsons Corp., 601 West Fifth Street, Los Angeles, through Navy Department, Washington,, for new shipbuilding plant on Sabine River, Orange, Tex., to be owned by Government and operated by company for building destroyers, for which large contract has been secured. Plant will comprise shipways, docks, one-story construction shops, power station and other structures on 70-acre tract. Cost about $5,000,000 with equipment.

Davis & Co., Inc., Commerce Building, Houston, Tex., oil operator, has let general contract to Winkle-Koch Engineering Co., Wichita, Kan., for new oil refinery at Brownsville, Tex., with steel tank storage department, boiler plant, pumping station and other structures. Cost close to $2,000,000 with machinery.

Western Pa. District

• **National Forge & Ordnance Co.**, Irvine, Pa., steel forgings, etc., has let contract to Rogers Structural Steel Co., Corry, Pa., for superstructure for one-story addition, 90 x 400 ft. Cost about $175,000 with equipment.

Westinghouse Electric & Mfg. Co., East Pittsburgh, will take bids on general contract about Oct. 15 for new one and multi-story factory branch, storage and distributing plant on Forrest Avenue, Atlanta, Ga. Cost over $500,000 with equipment. Robert & Co., Inc., Bona Allen Building, Atlanta, is architect and engineer.

Chemical Warfare Procurement District, War Department, 1046 New Federal Building, Pittsburgh, asks bids until Oct. 9 for nailless flat strapping, and open-type metal strapping seals (Circular 650-41-16).

Ohio and Indiana

• **American Electrical Products Co.**, Mansfield, Ohio, electric toys, instruments, etc., plans one-story addition, 50 x 130 ft. Cost close to $50,000 with equipment.

Wheelock-Lovejoy & Co., Inc., 5205 Hamilton Avenue, Cleveland, steel products, has let general contract to J. L. Hunting Co., Ninth-Chester Building, for one and two-story addition for storage and distribution. Cost about $45,000 with equipment.

Strietmann Biscuit Co., Twelfth Street and Central Parkway, Cincinnati, will take bids early this month for new one and two-story baking plant in Westover district, Mariemont, near Cincinnati. Cost close to $2,000,000 with traveling ovens, conveyors, loaders and other mechanical-handling equipment. John H. Deeken, Times-Star Building, is architect; A. M. Kinney, Inc., Carew Tower Building, is mechanical engineer.

Boice-Crane Co., 1730 Norwood Avenue, Toledo, Ohio, woodworking and metal-working machinery and parts, has acquired four one-story buildings formerly used by Willys-Overland Co., and will improve for expansion.

Kindt-Collins Co., 12697 Elmwood Avenue, Cleveland, pattern shop equipment and supplies, has approved plans for one-story addition, 120 x 121 ft. Cost over $75,000 with equipment. McKay Engineering Co., 13124 Shaker Square, is consulting engineer.

Eaton Mfg. Co., 739 East 140th Street, Cleveland, automotive products, has let general contract to Sam W. Emerson Co., 1836 Euclid Avenue, for one-story addition, about 40,000 sq. ft. floor space, for expansion in motor truck axle-manufacturing division. Cost about $150,000 with equipment. George S. Rider Co., Terminal Tower Building, is architect and engineer.

Board of Public Works, Decatur, Ind., asks bids until Oct. 8 for extensions and improvements in municipal power plant, including automatic combustion control equipment, surge tank, boiler-room instruments, induced draft fan, piping, etc. Cost about $72,750. Froehlich & Emery Engineering Co., Second National Bank Building, Toledo, Ohio, is consulting engineer.

Michigan District

• **Wolverine Bolt Co.**, 9685 Grinnell Avenue, Detroit, machine bolts, studs, etc., has let general contract to Heide Building Co., Detroit, for one-story addition. Cost close to $50,000 with equipment. E. T. Knopke, 9752 Yellowstone Street, is architect.

Budd Wheel Co., 12141 Charlevox Street, Detroit, steel automobile wheels, etc., has let general contract to Fullerton Construction Co., 11733 Russell Street, for one-story addition, 135 x 213 ft. Cost over $100,000 with equipment.

Ford Motor Co., Dearborn, Mich., is having plans drawn by Giffels & Vallet, Inc., Marquette Building, architect and engineer, for one-story additions at River Rouge plant, for production of aircraft engines and parts. Cost close to $10,000,000, of which approximately $7,000,000 will be expended for equipment.

Monroe Steel Castings Co., Monroe, Mich., automotive castings, has let general contract to Bennage & McKinstrie Co., 4612 Woodward Avenue, Detroit, for one-story foundry addition. Cost close to $50,000 with equipment. Edwin S. Carman, Inc., 1643 Lee Road, Cleveland, is engineer.

Middle West

• **Thompson-Bremer & Co.**, 1640 West Hubbard Street, Chicago, lock washers, lock terminals, etc., has let general contract to Olaf Swenson, 1347 Carmen Avenue, for one-story addition. Cost close to $45,000 with equipment. Melvin A. Nelson, 4633 North Hermitage Avenue, is architect.

Electro-Motive Corp., La Grange, Ill., diesel engine-driven locomotives, has let general contract to Ragner Benson, 4744 Rice Street, La Grange, for one-story addition, 250 x 300 ft., for expansion in electric-testing division and other departments. Cost close to $500,000 with equipment.

Badger Paper Mills, Inc., Peshtigo, Wis., tissue and other papers, has let general contract to Edward H. Meyer Construction Co., 75 Main Street, Oshkosh, Wis., for one-story addition, 160 x 240 ft. Cost over $125,000 with equipment.

Dubuque Packing Co., Dubuque, Iowa, meat packer, plans one and multi-story addition for expansion in processing and packing divisions. Cost close to $250,000 with equipment, Henschien, Everds & Crombie, 59 East Van Buren Street, Chicago, are architects and engineers.

Minneapolis-Honeywell Regulator Co., 2727 Fourth Avenue South, Minneapolis, Minn., heat regulators, thermostats, etc., has let general contract to C. F. Haglin & Sons, National Building, for four-story addition, 75 x 200 ft., to present one-story building. Cost about $250,000 with equipment. E. J. Prondzinski, Pence Building, is architect.

Board of Trustees, Dubuque County Hospital, Dubuque, Iowa, asks bids until Oct. 7 for addition to pumping station, including new turbine pumping unit and accessories. Cullen & Bartels, Lincoln Building, Dubuque, are consulting engineers.

Pacific Coast

• **Hughes Tool Co.**, 300 Hughes Street, Houston, Tex., oil-well tools and equipment, aircraft parts, etc., has acquired 40 acres at Main Street and Sepulveda Boulevard, Los Angeles, for new branch plant for parts production and assembling. Cost over $150,000 with equipment. Los Angeles branch is at 2445 Enterprise Avenue.

Bureau of Reclamation, Denver, asks bids until Oct. 7 for one 200-ton motor-driven transformer transfer car for Grand Coulee power plant, Grand Coulee, Wash. (Specification 1439-D), four gate frames and eight gate latches for 22 x 35-ft. fixed-wheel penstock gates for intake structure at Parker hydroelectric power plant, Parker Dam project, Arizona-California (Specification 1437-D); until Oct. 10, 100-ton gantry crane for handling penstock fixed-wheel gates at last noted power plant (Specification 1435-D).

Iron Fireman Mfg. Co., S. E. Seventeenth Street, Portland, stokers, parts, etc., will convert entire local plant for production of machined parts for bomber aircraft for Boeing Aircraft Corp., Seattle, with which contract has been made, to increase present facilities about 50 per cent. All stoker-manufacturing operations will be transferred to branch plant at 3170 West 106th Street, Cleveland, where increased capacity will be carried out.

Die Cast Corp., Glendale, Cal., die-castings, has let general contract to Harnish Co., 3479 Union Pacific Avenue, Los Angeles, for one-story plant at 668 Hawthorne Street, Glendale, about 18,000 sq. ft. floor space, with office building adjoining. Cost close to $50,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 8 for eight cast steel anchors, each 30,000 lb., and 20 similar anchors, each 20,000 lb. (Schedule 3293), motor-driven combination contour metal-sawing, filing and polishing machine (Schedule 3254) for San Diego, Cal., Naval Station; motor-driven bevel gear generator (Schedule 3283); until Oct. 11, for electric cable (Schedule 3285) for Mare Island Navy Yard.

Herbst Brothers, 1525 Mission Street, San Francisco, Cal., sheet metal products, have let general contract to F. R. Siegrist, 604 Mission Street, for one-story shop addition. Cost about $45,000 with equipment. L. H. Nishkian, 525 Market Street, is consulting engineer.

Canada

• **Gar Wood Industries, Ltd.**, Windsor, Ont., boat equipment, automobile bodies and hoists, etc., has let general contract to Allan Construction Co., Ltd., 44 Wyandotte Street East, for one-story addition, 85 x 150 ft. Cost close to $100,000 with equipment.

Canadian General Electric Co., Ltd., 212 King Street West, Toronto, Ont., has let general contract to A. W. Robertson, Ltd., 57 Bloor Street West, for one-story addition, 100 x 800 ft., to plant at Peterborough, Ont. Cost about $850,000 with equipment. John M. Lyle, 230 Bloor Street West, Toronto, is architect.

J. & R. Weir, Ltd., 33 Nazareth Street, Montreal, mechanical equipment, is erecting one-story machine shop, 80 x 150 ft., for which general contract recently was let to J. Thom & Co., Ltd., 660 St. Catherine Street West. Cost about $45,000 with equipment.

Department of Munitions and Supply, Ottawa, has awarded contract to H. G. Macdonald, Edmonton, Alta., for airplane assembly plant at Edmonton to cost $236,300. Equipment to cost extra. Also contract to Milne & Nicholls, Toronto, for factory at Leaside, Ont., to cost $350,000 for Research Enterprises, Ltd., a Government owned company, for manufacture of optical glass, precision instruments, etc.; and contract to Magloire Couchon, Ltd., Quebec, for addition to Dominion Arsenal at Valcartier, Que., to cost $171,600.

Canadian Locomotive Works, Ltd., Ontario and Johnson Streets, Kingston, Ont., has awarded contract to E. G. M. Cape & Co., Ltd., 620 Cathcart Street, Montreal, for plant addition. Cost about with equipment $75,000.